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Airline loyalty programs- a study examining American domestic airline loyalty programs and the population segments they may appeal.

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ABSTRACT

This study looks at top American domestic airlines and their loyalty programs and examines if it is worthwhile for consumers to stay loyal. This paper helps to better explain the rewards of loyalty and if it consumers who travel a few times a year casually should stay loyal or if they should look for their cheapest option. A survey was given to 85 anonymous individuals to share their experiences with airline loyalty.

Keywords: Marketing, Loyalty, Travel

INTRODUCTION

It is no mystery that marketers have placed a heavy importance on loyalty in the past decade. Your keychain that once had a just a set of keys and a charm on it, now likely has a half dozen loyalty cards on it. You likely have signed up for some loyalty program electronically and now can even look up a loyalty account by phone number if a card is not handy. Many loyalty programs are free and most often come with nice incentives for loyal business. Often time the incentive being the more you buy the more return you get.

For these programs to successfully work, the incentive to patron the business must be great enough to keep a customer loyal. Simply having a card that you swipe when you patron a store is not necessarily the point of a loyalty card. These incentive programs are intended to foster a more in-depth relationship with a current customer. In hopes that when having a choice as to which company to go with, you will likely choose to stay loyal to their particular brand.

Why is loyalty so important? There are many reasons that companies are fighting for loyalty to the point where they will incent use for staying loyal. One focus currently is a figure called the customer lifetime value often referred to as CLV. The CLV is something that many

companies have researched knowing that loyalty can make a lifetime value of a customer very high. In addition, it costs a lot more money to gain a new customer than it is to keep an old customer.

Another reason to stay in communication through a loyalty program is to stay fresh in a consumer's mind when they are ready to purchase their next product or service. "Nearly 65 percent of new Honda purchases replace and older Honda" (Kotler and Keller, 2014, p. 140).

A final key reason to keep customers loyal is to collect honest and valuable feedback. Marketing research can be costly, but it is very valuable. Having loyal customers and open lines of communications with them can certainly help to collect some very valuable and needed information to best serve your clients.

With a few major domestic airline players, it is no wonder they all offer a loyalty program to encourage customers to patron their airlines. Some of the loyalty perks are quite attractive. These include free trips, discounts, upgrades, priority boarding, free checked baggage, companion passes, and the list goes on. For anyone who enjoys travel, it is easy to be attracted to becoming loyal to an airline.

The question remains, does it pay to stay loyal? There are "road warriors" as they are often referred to in business that spend much of their time traveling around for business. They rack up countless miles and can easily earn these attractive rewards. The rest of us may not travel as much as road warriors but still board multiple flights a year. Does it pay to stay loyal? This study exams some of the major American domestic carriers to see if their loyalty reward programs are worthwhile to an average traveler. These programs are compared to see if any of them are more worthwhile than others and at what point it may be most advantageous to stay loyal.

LITERATURE REVIEW

Loyalty programs are not a new concept in business; hotels and airlines have had reward programs for almost 40 years. As early as the 1950's airlines tracked passengers and flights yet they did not know the value of this information. In the late 70's and early 80's frequent flyer programs really took hold. Prior to that historically there were other loyalty programs; one well known one is the S & H Green stamps. As people shopped at certain stores they were given green stamps, which they used to fill books, and collected rewards from a catalog. Stores would advertise that they had the S&H green stamps to bring customers in (Brown, 2010). These loyalty plans were proven to be successful.

Summary of airline rewards

Airline	Loyalty Program Name	Number of round trip JFK or LGA to LAX trips to earn a free round trip	Number of destinations served
Delta	Skymiles	15	337
United	Mileage plus	18 + \$11.20	337
American	AAdvantage	22	350
Southwest	Rapid rewards	20	101

Methodology

The study used to best understand loyalty was a 10 question survey administered online to collect a random sampling of respondents. There were 85 total respondents who participated in the survey.

Question number 1:

Consent that they can read or write English and that there is no financial gain in taking the survey as well as no penalty for opting out. It also gives a brief introduction to the survey. There options are to agree and continue the survey or disagree and not take the survey. This survey question was just to ensure if the participant did not read the introduction they still realized what the point of the survey is, that they were able to read the questions and that they realize there is no benefit received and they could opt out at any time. All 85 respondents did agree to the perimeters of the study with consent in question one.

Question 2:

On average how often do you travel by air during a 12-month period? The options are less than one time a year, 1-3 times a year, 4-5 times a year, and more than five times a year. Question number two is designed to understand how well traveled these participants are. There was no limitation to only include experienced or controversially inexperienced travelers in the survey, this question is to get a good understanding of the sample populations annual travel. This can also give the researchers and idea of how often this sample of the population is traveling to understand what type of loyalty program might be best for them.

38% responded that they travel 1-3 times a year with 18% responding that they travel around between four and five times a year.

Question 3:

Do you participate in an airlines reward program? The options for this question are yes or no. This question is to best understand what percentage of this sample is currently enrolled in at least one airlines reward program. Understanding this is twofold. First, we can see a reflection of participation in programs vs. the amount of flying this sample population is engaging in. Second this allows the researchers to best understand how popular participation is in general.

76% of survey participants are currently participating in an airlines reward program while 24% are not currently participating in a program.

Question 4:

When choosing an airline loyalty program rate the following program attributes: A rating of 1 is your least important attribute while a rating of 5 is the most important attribute. The options are: Ability to accumulate free flights, Ease in finding reward travel, Destinations served by the airline, No blackout dates and No expiration dates on points. This question is designed to best understand what attributes this sample population is looking for in an airline rewards program.

Using a weighted average, the ability to accumulate free flights ranked highest with a rated average of 4.3, followed by destinations served by airline at a weighted average of 3.93, no expiration date on points with a weighted average of 3.63, ease of finding reward tickets with an average of 3.61 and no blackout dates with an average of 3.24.

Question 5:

If given the choice, would you rather choose a cheaper flight or stay loyal to an airline to accumulate miles/points? The options for this question are: I would choose the cheaper flight, I would stay loyal to accumulate miles/points and It depends on what the price difference is. This is to understand "how" loyal customers are willing to be. As noted in the literature review loyalty programs are to keep customers loyal, this incentive should hold true even if the price is a little bit higher.

58% responded that it depends on what the price difference would be, 41% would choose the cheaper flight and 1% would stay loyal.

Question 6:

When booking an airline reward ticket which of the following factors is the most important to you? The options included: Travel dates, ticket price, baggage fees, baggage limitations, seat assignments, special accommodations, choice of departure airports, choice of arrival airports, airline rewards program, and other. This question is to understand the importance of each of these service standards to get an idea of which of these services may be most important to the population.

66% responded that price was their most important factor followed by choice of departure airports at 8%.

Question 7:

When booking an airline reward ticket which of the following devices would you most likely be using? The options being a smartphone/app, computer, tablet, or telephone. This is to get an idea of compatibility needs for these programs based on user preference.

62% responded that they would be utilizing a computer while 26 reportedly would use their smart phones. Zero responded reported that they would be utilizing the telephone.

Question 8:

Which airline are you most loyal to? The options include: Delta, United, Southwest, American Airlines, other and I'm not loyal to any airline. This question is designed to best understand which airline this particular group is most loyal to.

35% responded Southwest, followed by, 22% said not loyalty affiliation, 21% Delta, 9% American Airlines, 7% other, and 6% United.

Question 9:

What is your age? The ranges include: 18-24, 25-34, 35-44, 45-54, 55-64 and 65-74 and 75 and above. This question is to get a better understanding of demographic qualities of the sample population.

56% of the respondents were between the ages of 25 and 34. followed by 18% were between 35 and 44.

Question 10:

Is there anything else you would like to share with the researchers on airline loyalty? This is an open-ended question to get any other pertinent information the participants choose to share with the researcher.

The results varied. Some people wrote their loyalty was developed because they live in a "hub" city and could fly virtually anywhere nonstop. Or that their spouse had many loyalty points creating a situation where they stay loyal to the airline his business uses. Some responded it was impossible to accumulate enough points to get anywhere.

Conclusions

As mentioned previously the point of a loyalty program is to create a mutually beneficial relationship between the company and customer. Ideally this loyalty program should help to create a situation where customers will go out of their way to continue the relationship with the company or in this case airline due to benefit received.

Upon reviewing the loyalty chart create it is evident that unless a customer is flying cross country at least 15 times a year (round trip) they are not going to be able to earn that trip for free. 56% of the respondents in this survey reported flying 1-5 times on average a year. They also reported the ability to accumulating free flights is their biggest incentive to staying loyal. It is not

surprising given these numbers that given the choice between staying loyal or taking a cheaper flight only 1% of the respondents would stay loyal. Given the literature review and primary research it does appear that for a consumer that may only travel a few times a year it is not worth their while to stay loyal without factoring in other variables such as a rewards credit card or living in a hub city.

Recommendations

It is evident that for businesses who have employees that fly often it pays to stay loyal. Preferential treatment, ability to have free check luggage as well as accumulation of free flights makes it logical to stay loyal. For the many Americans who fly five times a year, the situation is not always as clear. Staying loyal while flying alone is not going to pay off for these individuals. It needs to be paired with other important factors such as if they can use a rewards credit card. Do they live in a hub city? Does the airline fly where they need to go? There are multiple other factors that stand in the way of these people staying loyal.

It is of the researchers' opinion that this is an important market for domestic airlines to go after. While it may not be cost effective to allow these individuals to earn free flights for individuals who are only flying five times a year, the industry should be looking to better market the accumulation of credit card points combined with airline loyalty and the perks that can be achieved in combination. Without properly marketing and conveying the message that loyalty can be rewarding to this market, these individuals will likely continue to base their travel needs off of which airline is offering them the best rate.

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Effect of Strategic Thinking Skills on Dimensions of competitive Advantage: Empirical Evidence from Jordan

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Abstract

The main aim of this research was to conduct an empirical investigation of the effect of strategic thinking skills on the dimensions of competitive advantage using a sample from banking sector in Jordan.

Strategic Thinking Questionnaire (STQ) was used to collect data for the investigation. Four models to capture the effect of each skill of strategic thinking on each dimensions of competitive advantage were developed and tested through several hypotheses using multiple regression analysis as a tool for data analysis and hypotheses testing.

Results indicated that, reflecting as a strategic thinking skill has a significant effect on all dimensions of competitive advantage in all models. On the other hand, the remaining two (system thinking and reframing) skills of strategic thinking failed to show any significant effect on competitive advantage in all models tested in this research.

Key words: Strategic Thinking, Competitive Advantage, STQ, Strategic Management

1. Introduction

In our modern time, all business organizations face complex problems due to massive changes taking place in the external environments. These changes require new innovative thinking approaches in order to be able to respond effectively to them. In many cases effective solutions to problems conducted by corporate executives provide only temporary solutions to diversified organizational problems which lead later to the creation of more complex problems. One of these problems is related to difficulties in the process of strategic planning due to the lack of the required strategic thinking on part of the strategic executives.

It has been noted by many researchers that, skills of strategic thinking usually create a dynamic situation at both organizational as well as individual levels. This normally leads to formation of core requirements for the achievement of corporate competitive advantage (Walters, Frome and Hend, 2013).

Strategic thinking provides executives with the ability to develop a clearly focused vision and therefore allow them to think with strategic purpose. Having such skills, executives can clearly formulate their organization's strategic objectives and designing strategic action plans to achieve them. An executive with strategic thinking skills can utilize thinking process with high degree of flexibility. Therefore, the most significant trait of strategic thinking can be seen in the ability of managers to employ these advanced human thinking skills in organizational problem solving process and adaptation with external turbulent environment in an innovative manner. This will actually lead to alleviating organizational competitive approaches to the highest possible positions in the competitive markets. Based on this argument, adapting and developing strategic thinking skills should clearly accomplish many advantages to corporations. (McCauley, 2012).

2. Theoretical Background

Pisapia (2006) indicated that leaders usually fail when facing chaotic, complex and turbulent environments. This usually happened because managers were trained to use their minds according to linear systemic thinking where such mind cannot function properly in all situation.

Due to such work environment they stand helpless to identify critical environmental forces which renders there organization unfunctional. This leads to a situation where internal corporate strengths cannot be allied with the required critical path of success.

These findings have been supported by other research findings (Moldoveanu, 2009) which showed that linear thinking does not align with current stage of human history where massive changes are taking place. The conclusion that can be drawn here is that, our modern external environment requires new class of strategic executives with high levels of cognitive and analytical skills.

Golden (2011) defined strategic thinking as a process aims at improving organizational functioning through smart decision making process. Strategic thinking as a concept is usually relayed to innovative approaches. This process requires managerial thought beyond day to day operational thinking that go in line with organization's strategic objectives. Strategic thinking is usually comprised of several activities such as data corrections, an analysis and exchange of thoughts about an issue and a structured way that leads to acquiring correct answers to specific issues.

Strategic thinking is a process that embedded the manner in which people think and rethink, evaluate, view, and conduct the future for themselves and others. Strategic thinking is an extremely effective and valuable tool. One can apply strategic thinking to arrive at decisions that can be related to work or personal life. Strategic thinking involves developing an entire set of critical cognitive and analytical skills.

Executive with Strategic thinking skills have the ability to use the left (logical) and right (creative) sides of their brain, a skill that can be significantly valuable for strategy making process.

Moreover, executives with strategic thinking skills usually have the ability to formulate a clearly focused strategic vision. They have sharp skills at both thinking with a strategic purpose as well as formulating a visioning process. They enjoy both skills and they utilize them in an integrative approach.

Executives with strategic thinking skills have the ability to define their objectives in a focused way and initiate action plan with exact resources to produce high quality output.

Executives with strategic thinking skills usually have the capability to inject strategic flexibility into their strategy by creating benchmarking system for the evaluation and control process. (rbradford@cssp.com)

Strategic thinking is considered a vital business process due to its role in strengthening the overall organizational performance management and effectiveness. Moreover, its connection to new product development is widely considered as a crucial operation for industrial concern.

Based on such rationality, a study was conducted by Syeda Asiya Zenab Kazmi et al (2016) as an attempt to link the concept of strategic thinking with product strategy with the aim of formulating an analytical approach to this relationship. Researchers aimed at formulating a research framework to offer industrial executives, an approach to connect various aspects of this process to corporate strategy and product innovations. A survey was developed and conducted on 30 team members working in the area new product development departments at three locations of a European multinational company. Findings supported the researchers' theoretical hypotheses connecting strategic thinking and new product innovation. The study results indicated that, the most significant variables that have shown positive relationship were early client involvement, customer value, and management initiatives.

Ranjith (2016) conducted a study on the relationship between business models and competitive advantage. His basic theoretical assumption was that firms in the emerging markets main focus is to gain sustainable competitive advantage. The researcher hypothesized that a strong relationship between business models and the competitive advantage does exist. He defined an effective business model as a combination of deliberately manipulated resources and capabilities to create and sustain competitive advantage. The main objective of his research was to conduct an attempt to study the emerging markets business models contribution to competitive advantage. To achieve this end, the researcher has employed multiple case studies which were developed in different time periods. Findings indicated that, companies with multiple business models tended to have higher chances of creating competitive advantage.

Nurul Nadia Abd Aziz and Sarminah Samad (2016), have conducted a study to examine the effect of innovation on competitive advantage in food manufacturing SMEs in Malaysia. Researchers have also investigated the possible moderating effect of firm age on innovation that contributes to the creation of competitive advantage. A random sampling was drawn from the small and medium size Malaysian food manufacturing sector. Subsequently, a structured questionnaire was used to collect data from the selected sample. Suitable descriptive and inferential statistics were utilized to test the study hypotheses. Results of testing the study hypotheses showed that innovation has a strong positive effect on the competitive advantage. Findings

confirmed that innovation was responsible for 73.5 percent of the variance in competitive advantage, which obviously indicate that for SMEs to gain competitive advantage they must invest heavily in innovation. Another important result was that there was a significant moderating effect of firm age on innovation accounting for competitive advantage.

In an important multi-cultural study conducted by Pisapia et al (2009), Cognition was viewed as the way human uses mental processing to acquire knowledge, manipulate ideas, and process information and beliefs. The Strategic Thinking Questionnaire (STQ), which measures three such mental process (systems thinking, reframing and reflection), was used in this research to collect data from samples of students who are preparing for school leadership roles at four universities in the United States, Malaysia, Hong Kong, and Shanghai in China. Researchers were operating under the assumption that the use of these skills should vary from country to country due to western and eastern varying cultural settings. To the researcher surprise, and based on self-reported data from 328 respondents, researchers found that the use of strategic thinking skills (system thinking, reframing and reflecting) were observed in all locations but the variance in their use is more a function of age of respondents, and gender rather than location. Based on these findings, the researchers asserted that these findings have significant implications for training, professional development, and selection of strategic leaders.

The theme of the previous argument should lead to the conclusion that, to think strategically as previous literature implies, strategists have to develop a full understanding of the processes of strategic thinking and its connection to contextual environments in which the strategic thinking is taking place. Under such consideration, the nature of the competitive landscape usually set the requirements for thinking strategically, and as the environment become more complex, additional considerations had to be integrated into the strategic thinking system.

3. Objective of the Research

This research aims at the assessment of the effect of strategic thinking on the achievement of competitive advantage on a sample of banking firms in Jordan.

4. Research Methodology

To reach the above objective, researchers have designed the following model for this investigation.

4.1 The independent Variables:

For the purpose of this research strategic thinking is going to represent the independent variable which is comprised of three dimensions called skills of strategic thinking.

4.1.1 Dimension one: Reflecting

Reflecting refers to the ability of a leader to integrate logical and rational thinking processes together using experience, perception and information to make sound judgement about certain state of affair then initiate a concept that guides what would happen at present and help guide the future perspective, (Pisapia, 2009).

4.1.2 Dimension two: Reframing

Reframing refers to the ability of an executive to cover wide range of perspectives, switching flexibly across multiple strategic modes and mental models. This trait is vital for strategic leaders to help them generate strategic options and focus on the essentials. It enables executives to classify opportunities and strategic options so that focus continues to be sharp on vital component of strategic issues. It also helps them to see threats and problems in a clear manner allowing them to map out options and identify trends ahead of other competitors, (Pisapia, 2009).

4.1.3 Dimension three: System Thinking

System thinking refers to the ability of an executive to observe systems comprehensively and interactively by understanding the inner function ability and interrelationships that interact to create patterns of behaviors which help generate sound strategic options. It is that holistic capable mind which can be able to define the entire situation and breaking it downs into manageable parts to facilitate identifying suitable solutions, (Pisapia, 2009).

4.2 The dependent Variable

For the purpose of this research competitive advantage is going to represent the dependent variable. Four dimensions of competitive advantage are going to be used here.

4.2.1 Dimension of Cost

This dimension represents the firm ability to reduce total cost of operations thus increasing profitability compared to competitors. It includes measures reducing production cost and minimization of waste and bad products. Some of the most important features of cost may refer to having standardized products, reasonable quality and product features, putting more emphasis on production efficiency, and conducting continuous cost reduction in the area of value chain activities.

It may also include considerations related to the management of manufacturing cost, value added, running cost and service cost.

4.2.2 Dimension of Quality

This dimension represents the firm ability to present the market with unique product that differentiates it from competitors. It includes measures such as managing quality and quality assurance, systems of quality feedback, and level of employees' qualifications. This dimension may include performance and features of products, reliability and conformance of products to specifications, durability and serviceability, value to customer and reputation.

4.2.3 Dimension of Flexibility

This dimension involves firm's ability to produce and successfully market new products and make modifications to old products.

It may include several activities such as ability to successfully manage incoming materials of different quality, and ability to satisfy demand for different levels of quality, and ability to manage the introduction of new products to markets.

Flexibility as dimension of competitive advantage can also be seen in activities such as the company capability to modifying existing products to respond to customer changes in preferences and needs, ability to cope with changes in the product mix in changes in resource mix.

4.2.4 Dimension of Time and Delivery

This dimension represents firm's ability to provide on time services in an integrative manner. This process may include delivery component such as manufacturing lead time, levels of due date activities, Rate of product introduction, Delivery lead time and frequency of delivery.

4.3 The Research tool

In an attempt to present an evidence of the significance of strategic thinking skills as related to competitive advantage, the researchers have conducted a thorough survey of the previous literature to build up a suitable theoretical background. Then a questionnaire was borrowed from Pisapia (2007) to measure strategic thinking, and used to collect primary data from the whole population of 16 banks operating in the banking industry in Jordan. The targeted unit of the sample was the executives at different managerial levels in these banks. In this study, the target population was approximately 227 executive managers.

This questionnaire has been developed by Pisapia and subjected to several validations over several years and proved to be valid and reliable. It has been also translated into several languages and used in subsequent research by many researchers.

It has been designed to provide an empirical assessment of three strategic thinking skills: reflecting, reframing and system thinking. It is believed that these three cognitive strategic thinking skills should represent respondents' ability to think in a flexible and strategic manner, thus provide them with necessary skills to lead strategically.

"The original STQ developers (Pisapia, Reyes-Guerra, & Coukos (2005) have reviewed the literature and then defined the three cognitive skills. Using the definitions as guides, they wrote statements describing skills required to think in systems, reframing, and reflection terms. A panel of five experts knowledgeable about strategic thinking reviewed the resulting 180 items. They sorted the statements into the three categories. In an iterative fashion, the statements were modified or discarded following lengthy discussions and repeated feedback sessions between the panel and researchers. Items on the STQ are cast on a five-point Likert scale.

For the purpose of collecting primary data for dimensions of competitive advantage, a questionnaire was borrowed from Nsour (2016) and used to collect data for this purpose.

In this questionnaire based on the operational definitions developed, the dimensions of competitive advantage was measured through 22 statements on a Likert five-scale system ranging from very low to very high. The

cost dimension of competitive advantage was represented by 6 statements from 1-6, followed by the quality dimension represented by 6 statements from 7-12. The dimension of flexibility was represented by 7 statements from 13-19. Lastly, the delivery dimension of the competitive advantage was measured by 3 statements from 19-22.

Both questionnaires were reproduced and distributed to all banks in Jordan. A total of 100 usable questionnaires was received and used in this research.

5. Models Formulated and Tested

For the purpose of this research and based in the previous theoretical background developed earlier, the following four models were formulated and tested using Multiple regression analysis as a statistical technique for data analysis.

This categorization of the research design generates four regression models:

5.1 First Model:

$$Y1 = a + b1x1 + b2x2 + b3x3$$

Where,

Y1 is the cost dimension of the competitive advantage

a is the intercept,

b1 is the regression coefficient of x1,

b2 is the regression coefficient of x2 and,

b3 is the regression coefficient of x3.

X1 is the reflection dimension of strategic thinking

X2 is the reframing dimension of strategic thinking

X3 is the system thinking of strategic thinking

5.2 Second Model:

$$Y2 = a + b1x1 + b2x2 + b3x3$$

Where,

Y2 is the quality dimension of competitive advantage,

and other parameters and independent variables are as in model one.

5.3 Third Model:

$$Y3 = a + b1x1 + b2x2 + b3x3$$

Where Y3 is the flexibility dimension of competitive advantage

and other parameters and independent variables are as in model one.

5.4 Fourth Model:

$$Y4 = a + b1x1 + b2x2 + b3x3$$

Where Y4 is the time and delivery dimension of competitive advantage

and other parameters and independent variables are as in model one.

6. The Research Hypotheses

To reach the intended outcome of this research, following are the hypotheses developed by the researchers and stated in a null format:

H01: Strategic thinking skills (reflecting, reframing and system thinking) have significant effect on the cost dimension of competitive advantage.

H02: Strategic thinking skills (reflecting, reframing and system thinking) has significant effect on the quality dimension of competitive advantage

H03: Strategic thinking skills (reflecting, reframing and system thinking) has significant effect on the flexibility dimension of competitive advantage

H04: Strategic thinking skills (reflecting, reframing and system thinking) have significant effect on the delivery dimension of competitive advantage.

This impact of the independent variables on the dependent variables in these models is going to be considered significant at (0.05) or less.

7. Results of Testing the Research Hypotheses

Following are the results of testing the research hypotheses after applying multiple regression analysis:

$$\text{Model one: } Y1 = a + b1x1 + b2x2 + b3x3 + b4x4$$

Y1 (Dependent variable) is cost dimension of competitive advantage

Table 1 shows the results of testing the goodness of fit of model one. Results indicated that the f-statistics is 2.666 and the related significance is 0.05. Based on these values the model is fit for testing the hypotheses.

Table1. Result of Testing Model one Goodness of Fit

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2.837	3	.946	2.666	.052a
Residual	33.702	95	.355		
Total	36.540	98			

Predictors: (Constant), System Thinking, reframing, Reflecting .a

b. Dependent Variable: Cost Dimension .b

Table 2 shows the parameters related to testing hypotheses in this model. As indicated, both reflecting and system thinking has no significant effect on the cost dimension of competitive advantage, therefore both null hypotheses are accepted. On the other hand, reframing has a moderate significant effect ($p=0.07$), which permits researchers to reject the null hypothesis and conclude that reframing as a skill of strategic thinking may influence the cost dimension of competitive advantage moderately.

Table 2. Results of testing hypotheses for model one

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.378	.553		4.299	.000
Reframing	.212	.118	.187	1.800	.075
Reflecting	.143	.163	.127	.877	.383
SystemThinking	.045	.176	.036	.256	.799

Dependent Variable: CostDimension .a

$$\text{Model two: } Y2 = a + b1x1 + b2x2 + b3x3$$

Y2 (dependent variable) is the quality dimension of competitive advantage. Results of testing the goodness of fit for this model are shown in Table 3 below. Since f-stat is 4.531 and its significance is 0.005, researchers concluded that the goodness of fit of this model is significant and therefore model is fit for testing the hypotheses.

Table 3. Results of Testing Model Two for Goodness of Fit

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	6.238	3	2.079	4.531	.005a
Residual	43.598	95	.459		
Total	49.836	98			

a. Predictors: (Constant), System Thinking, reframing, Reflecting

b. Dependent Variable: Quality Dimension

Table 4 shows the results of testing the hypotheses in this model. As shown, reflecting has highly significant effect ($p = 0.004$) and system thinking has a moderate effect on the quality dimension of competitive advantage. On the other hand no significant effect of reframing was detected.

Table 4. Results of Testing the Hypotheses for Model two Dependent Variable: Quality Dimension

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.453	.629		3.898	.000
Reframing	.194	.134	.147	1.450	.150
Reflecting	.540	.185	.410	2.916	.004
System Thinking	-.350	.200	-.241	-1.746	.084

Dependent Variable: Quality Dimension .a

$$\text{Model three: } Y_3 = a + b_1x_1 + b_2x_2 + b_3x_3$$

Y_3 (dependent variable) is the flexibility dimension of competitive advantage.

As shown in Table 5, model three has highly significant goodness of fit since f-stat is 5.754 and its significance is 0.001 which indicate that the model is fit for testing the hypotheses.

Table 5. Results of Testing Model three Goodness of Fit

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	5.210	3	1.737	5.754	.001a
Residual	28.673	95	.302		
Total	33.883	98			

a. Predictors: (Constant), System Thinking, reframing, Reflecting

b. Dependent Variable: Flexibility Dimension

Results of testing the model hypotheses are shown in Table 6. As indicated, both null hypotheses for reframing and system thinking were accepted, indicating that they have no significant effect on the flexibility dimension of competitive advantage.

On the other hand, the null hypothesis is rejected at ($p = 0.033$), concluding that reflecting has significant effect on the flexibility dimension of competitive advantage.

Table 6. Results of Testing the Hypotheses for Model Three

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.079	.510		4.074	.000
Reframing	.110	.109	.101	1.009	.315
Reflecting	.326	.150	.300	2.168	.033
SystemThinking	.076	.162	.063	.466	.642

a. Dependent Variable: Flexibility Dimension

$$\text{Model four: } Y_4 = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4$$

Y₄ (dependent variable) is the delivery dimension of competitive advantage.

Table 7 shows the results of testing model four's goodness of fit. As indicated, the model is fit since f-stat is 2.836 and its significance is 0.042. Therefore the model is fit for hypotheses testing.

Table 7. Results of Testing Model Four Goodness of Fit

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	6.970	3	2.323	2.836	.042
Residual	77.827	95	.819		
Total	84.797	98			

Predictors: (Constant), System Thinking, reframing, Reflecting .a

Dependent Variable: Delivery Dimension .b

Table 8 shows the Statistic parameters for testing this model hypotheses. As shown, null hypotheses related to reframing and system thinking were accepted, indicating that both strategic thinking skills do not have any significant effect on the delivery dimension of competitive advantage.

On the other hand, null hypothesis related to the effect of reflecting was rejected concluding that reflecting as a strategic thinking skill has significant effect on the delivery dimension of competitive advantage.

Table 8 Results of Testing the Hypotheses for Model Four

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.973	.841		2.347	.021

Reframing	.199	.179	.115	1.111	.270
Reflecting	.490	.248	.285	1.981	.051
System Thinking	-.164	.268	-.087	-.612	.542
Dependent Variable: Delivery Dimension .a					

8. Conclusions and Discussions

As presented in the previous section, results of testing the research hypotheses yielded the following conclusions:

- The constant was always significant in all models indicating that there are other independent variables other than those included in the model which have significant effect on competitive advantage in the four dimensions used in this research. -1
- Reflecting as a skill of strategic thinking has always been significant in all models except in model one (cost dimension) indicating that it has the most effect on all dimensions of competitive advantage. The values of t and alpha were 2.916 at 0.004 for quality for flexibility, 2.168 at .03, and 1.981 at 0.05 level of significance for delivery dimension. -2
- Reframing as a skill in strategic thinking has a slightly positive non-significant effect on the dimensions of competitive advantage in all models. -3
- System thinking as a skill in strategic thinking has a very week negative non-significant effect on the dimensions of competitive advantage in all models. -4

These results allows researchers to conclude that, in this sample only reflecting as a skill in the process of strategic thinking has a constant and significant effect on all dimensions of competitive advantage except the cost dimension.

This results might have been materialized because of the fact that Reflecting refers to the ability of a leader to integrate logical and rational thinking processes together using experience, perception and information to make sound judgement about certain state of affair then initiate a concept that guides what would happen at present and help guide the future perspective.

Such skill seems to be the most important strategic thinking skill due to its close relation to decision making. In the final analysis, decision making capability of a strategic leader is so vital for the leader to deal with current as well as future complex circumstances.

Finally future research on this topic should be extended to include other sectors of the Jordanian economy such as industrial sector so that a better understanding of the relationships embedded in this study results can be realized.

Onelimination of the research is that it is was restricted to one country and a sample from one industry namely the banking sector in Jordan which led to a small sample size. The cross sectional nature of the research may also be considered as one more limitation for the current research.

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The Relationship between Occupational Social Status and Intention to Leave Occupation and Job Satisfaction in Tourism: A study on Public Employees¹

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Abstract

This research aims to examine the relationship between occupational social status, intention to leave occupation and job satisfaction. In accordance with this purpose, the data were collected from the employees of public business related to tourism via a structured questionnaire. The study differs from other studies and is important because the research is about the employees working in public sector related to tourism. The results showed that occupational social status is affecting job satisfaction positively, while the negative effect of intention to leave occupation on job satisfaction is statistically insignificant. The managerial implications and limitations of the study are discussed in the conclusion.

Keywords: Occupational commitment, Occupational social status, Work values, Tourism.

Main Conference Topic: Tourism, Organizational Behavior

Introduction

Performance of employees is an important and decisive factor in ensuring sustainability in tourism sector due to its labor intensive structure. Therefore, it is important to manage the human resources, as well as all the resources they have, and to determine the factors that affect the performance of the human resources that are constantly in contact with customers in order to provide service quality and customer satisfaction, in tourism sector. Reliance on human resources for proper functioning and growth requires both efficient and productive labor force practices to ensure that employees perform optimally. Hence, organizations concentrate on different variables in order to keep pace with the rapid changes in the sector, to protect the competitive advantage and to keep the assets in a global environment. There is a strong link between employee satisfaction and performance (Gu and Chi, 2009). Due to working hours and intense work tempos, job satisfaction must be high to ensure the continuity of performance and efficiency in the tourism sector. On the other hand, those with high perceptions of occupational social status will have increased occupational commitment (Aca, et al., 2013) and will become more likely to serve. As a result of employees' quality and respectful service, their performance will also be high (Teng and Barrows, 2009).

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In the tourism sector with a high labor turnover rate, the increase in the recruitment and training costs of new employees (Davidson et al., 2010), unfamiliarity of workplace and poor service qualities (Denvir and McMahon, 1992) and low commitment (Smith et al., 1996) are the problems encountered. For this reason, it is crucial to know the causes that push employees to leave their occupation. Apart from the correctness of the decisions taken, the success of tourism policies and plans is also related to the perceptions and behaviors of practitioners, in other words, those working in the public sector related to tourism. In the literature review so far, there has not yet attained a study on the topics mentioned in the public sector related to tourism. In this context, it is considered that this study has an original value and contributes to the literature by filling that gap.

Theoretical Framework

The occupation is defined as a set of information-based and skill-based activities that is made as a result of a certain educational outcome to enable individuals to live on (Sarıkaya and Khorshid, 2009). The general position of an occupation refers to the occupational social status, expressing a measure of the social status of that occupation. This measure includes different social evaluations about occupations. The concept of occupational social status, which is social perception based on the occupational position of the individual, is defined as a form of social power and superiority that is symbolic rather than economic or political and provides respect, acceptance and exceptional relationships (Goldthorpe and Hope, 1972). In this respect, occupation leads to social differentiation among individuals in terms of respectability, satisfying opportunities, functional perception in the society and gaining an identity. Because there is a direct proportionate relationship between the level of respectability of the social status that an occupation provides and the level of respectability of that occupation in the society. Indeed, the more the society perceives the occupation as esteemed, the more dignity the individual will gain (Ilhan, 2004).

One of the major factors of the quitting an occupation is the intention to leave (Rizwan et al., 2014: 4), a devastating behavior when working conditions do not satisfy employees (Rusbult et al., 1988: 599). Indeed, when an employee who does not have job satisfaction and decides to leave work will fulfill this intention, his colleagues, the environment and the organization will also face negative consequences (Lu et al., 2002: 215). It is defined as the intention of an employee to leave his current job or company and the planing to leave his job to have a better offer or improvement (Purani and Sahadev, 2008). Intention to leave the occupation is an multistep process including psychological, cognitive and behavioral components (Takase, 2010). The psychological dimensions include psychological reactions to the negative aspects of workplace and occupation (Chiu, et al., 2005, Susskind, 2007). These reactions are believed to trigger disengagement behaviors such as disillusionment and dissatisfaction with their organizations (Vigoda-Gadot and Ben-Zion, 2004). The cognitive dimension is regarded as the center of intention to leave, and the individual takes a decision or plans to leave his occupation at this dimension. In the behavioral dimension, the third and final component, actions for leaving current job and future opportunities are shown. In these actions, which may be behavioral or verbal, behavioral statements may be dreaming during working (Chiu, et al., 2005; Susskind, 2007), less enthusiastic (Chen and Francesco, 2000), coming late to work (Harris et al., 2005), absenteeism (Krausz et al., 1998); verbal statements are intentions stated or announced for leaving from work (Freund, 2005).

Job satisfaction is defined as a positive emotional state resulting from subjective experience with the individual's work (Locke, 1976). In another definition, job satisfaction is also explained as "having a positive feeling about the one's work as a result of the evaluation of the work's characteristics" (Robbins and Judge, 2013: 27). Job dissatisfaction has an important effect on negative work consequences such as underperforming, low productivity,

absenteeism and intention to leave the job (Rusbult et al., 1988; Graham and Messner, 1998). While a satisfactory job has a positive effect on the physical and mental health of employees, a job that creates job dissatisfaction can cause employees to feel uneasy feelings, increase complaints and grievances, rise in absenteeism and delay rate and have also psychosomatic disturbances (Başaran, 2008; Eroğlu, 2013). Besides demographic characteristics such as age, gender, education level; the factors as content of work, the wage policy, the working conditions affect the job satisfaction (Musal et al., 1995), so it is considered that professional social status will have an impact on job satisfaction.

Materials and Methods

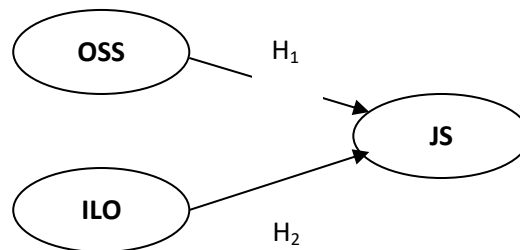
This study aims to reveal the relationship between Occupational Social Status (OSS), Intention to Leave Occupation (ILO) and Job Satisfaction (JS) in in tourism. This study differs from other studies and is important because the research is about the employees working in public sector related to tourism. In this context two hypotheses are developed.

H₁: Occupational social status has a positive effect on job satisfaction

H₂: Intention to leave occupation has a negative effect on job satisfaction.

The data which were gathered in February and March 2018 from the employees of Provincial Directorate of Culture and Tourism in Muğla, Turkey are analyzed via SPSS 22.0 and AMOS 21.0. The proposed model is shown in Figure 1.

Figure 1. Proposed Model



The questionnaire of the study consisted of two sections. In the first part; there are four items in OSS Scale and four items in ILO scale which were developed by Kusluvan & Kusluvan (2000) and validated by Saltık et al. (2016), and five items in JS Scale retrieved from Job Descriptive Index and validated by Parsons and Hulin (1982) and Toker (2007). All the items were measured using a 5 point likert type scale ranging from 1-strongly disagree to 5-strongly agree. In the second part there are some more questions about the demographic features (gender, marital status, age, education) of the participants.

Results

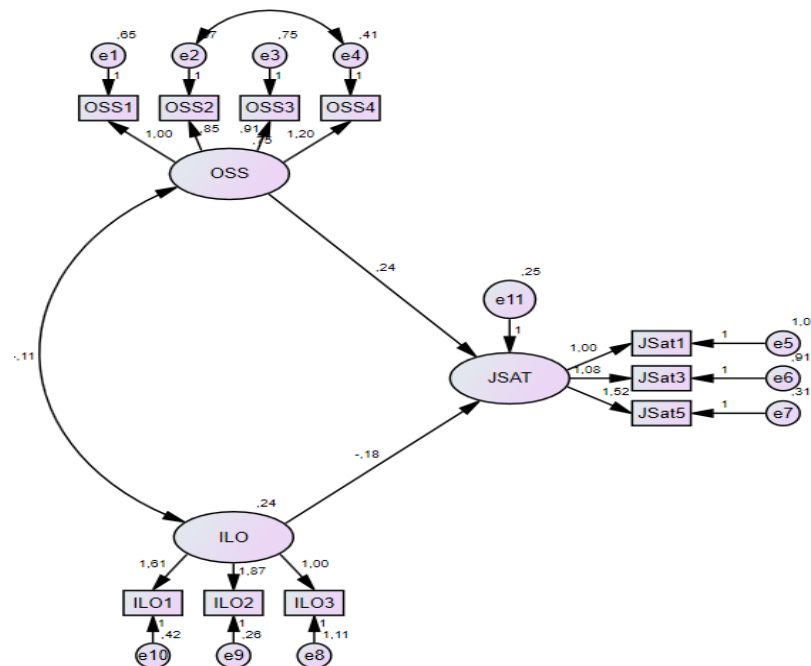
The participants were % 51,4 male, and % 74 married. The age of participants are differs from 23 to 63. In terms of education, % 54,8 had a bachelor degree and % 22,6 had high school graduate. The most of the participants (%80,8) didn't have any education related to tourism.

Exploratory factor analysis was conducted to reveal dimensional structure of the scales, by performing principal components analysis and varimax rotation, using SPSS 21.0. The Kaiser–Meyer–Olkin value was ,708 which is higher than the recommended minimum value of ,6 and the Bartlett's Test of Sphericity reached statistical significance (.00), supporting the adequacy of sampling (Field, 2000). One item from ILO scale and two items from JS scale were eliminated because of cross-loading. Consequently, it has been

determined that each of the subscales conform to its one-factor structure. Cronbach's alpha coefficient was used to assess the internal consistency reliability. In the study, Cronbach's alpha values were ,702 for OSS scale, ,706 for ILO scale and ,639 for JS scale; that indicate all the subscales were higher than accepted lower limit suggested by Hair et al (1998).

Path analysis was applied to test the hypotheses, using AMOS 6.0. Several fit criteria were used to assess the measurement model, including the chi-square and comparative fit index (CFI), normed fit index (NFI), goodness-of-fit index (GFI), and adjusted goodness-of-fit index (AGFI). Inspection of model fit revealed indices that were generally above the acceptable thresholds ($\chi^2/df=1,614$; RMSEA=0.054; GFI=0.953; NFI=0.917; CFI=0.966). The results of path analysis including obtained t values are presented in Figure 2.

Figure 2. Path Analysis Results



Findings suggest that occupational social status affects positively and significantly job satisfaction ($.24$; $p < .05$). Nevertheless negative effect of intention to leave occupation on job satisfaction is statistically nonsignificant ($-.18$; $p > .05$). Consequently, H_1 is accepted and H_2 is rejected.

Conclusion

In this study, the relationship between occupational social status, intent to leave the profession, and job satisfaction is examined. For this purpose, data were gathered from the employees working in public sector related to tourism. As a result, important findings about the behavior of employees in the public sector related to tourism in the province of Mugla in Turkey, which is one of the leading tourism destinations are revealed. When research findings were examined, it was determined that job satisfaction increased as employees' perceptions of occupational social status heightened. As predicted, a relationship is determined to reduce job satisfaction as the intention to leave the profession increases, however this relationship was statistically nonsignificant at the level of ,05 while it was significant at the level of ,10. Hence, it is suggested this relation to be re-tested in a study with a wider sample. Thus, besides the studies that assert the inverse relationship between the intention of leaving the profession and the level of job satisfaction of tourism workers in the private sector; it could be possible to contribute to the literature to show the existence or

absence of the same relationship in public sector employees. The findings will also contribute to the development of proposals for identifying and developing elements that affect the behavior of tourism workers, who have a key role in ensuring successful tourism practices and efficient destination management. In this context, it is suggested that occupational social status perception of employees in the public sector related to tourism should be regarded as a means to increase the motivation and satisfaction levels of them.

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An Analysis On The Relationship Between Financial Literacy And Entrepreneurial Intention: Evidence From Turkish University Students

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Abstract

The purpose of this study is to examine the relationship between financial literacy and entrepreneurial intention of university students. This study examines the financial literacy levels of university students in terms of financial knowledge, attitude and behavior. In simple terms, “entrepreneurial intention” is one’s willingness in undertaking entrepreneurial activity, or in other words to become self-employed. For this purpose, a questionnaire is carried out on students enrolled in various faculties of Marmara University. Statistical analysis is performed with the data obtained by the questionnaire.

Keywords: Financial Literacy, Entrepreneurial Intention, University Students

Main Conference Topic: Economics, Management and Marketing

Introduction

The positive relationship between entrepreneurship and economic growth has been proven by many researchers (Acs and Audretsch 2003; Audretsch and Keilbach 2003). Still today, however, no consensus has been reached on the factors that leads to successful entrepreneurship. Entrepreneurship studies that focused on personality traits are the studies that prioritize personality traits of individual entrepreneurs and this perspective aims to distinguish entrepreneurs from non-entrepreneurs.

The impact of financial issues on entrepreneurship and new business performance is also an area for investigation in entrepreneurship literature. It is widely known that inadequate trade and business knowledge stemming from inadequate financial competence weakens entrepreneurial activities (Bosma and Harding, 2006). Although, financial management is one of the curtail competencies for new ventures (Timmons and Spinelli, 2007:269); some entrepreneurs may lack the basic financial literacy (Drexler, Fischer, and Schoar, 2010). There is a consensus in the literature that entrepreneurs are inadequate in financial literacy, and that this inadequacy weakens the chances of successful venture creation and management (Wise, 2013). On the other hand, there are not enough studies on the effects of business and financial education on entrepreneurial output. It is therefore emphasized that there is a need to study more about entrepreneurs’ financial education and how financial issues affects the new venture (Kotzè and Smit, 2008; Karlan and Valdivia, 2010; Wise, 2013). Oseifuah (2010) states that further research is needed to confirm the impact of financial literacy on

young entrepreneurs. In order to answer these needs mentioned in literature, this study aims to present some ideas about the financial literacy levels of entrepreneurial candidates by examining the relationship between financial literacy and entrepreneurial intentions.

Entrepreneurial Intention and Financial Literacy

In entrepreneurship research, the intentions of individuals to start new business are confronted as a very basic and widely used phenomenon (Thompson, 2009). In fact, it is important to understand the reasons that constitute the intention to establish business in order to understand entrepreneurial behavior (Douglas and Fitzsimmons, 2013). The most general definition of entrepreneurial intention is the desire of a person to engage in business activities at any time during his/her career. In other words, the intention of entrepreneurship is the intention of establishing one's own business. It can be defined as establishing self-employment, that is, being a salaried or paid employee in the opposite way of entrepreneurship (Tkachev and Kolvereid, 1999).

Several factors have been mentioned in the literature that affect entrepreneurial intentions (Kolvereid, 1996; Verheul et al., 2005), including demographic factors age, gender, education, employment and parental effects. Studies show that people often decide to start a business between the ages of 25 and 45; where such tendency increases between the ages 25 and 34, (Delmar and Davidsson, 2000). In addition, empirical studies have described entrepreneurial intention by focusing on basic individual characteristics like education, pre-employment experience and parental effects (Kristiansen and Indarti, 2004). Past entrepreneurial experiences and involvement in the establishment of different companies may have a positive influence on entrepreneurial intentions as entrepreneur will have an idea about possible the risks and problems associated with a new enterprise (Phan et al., 2002; Tkachev and Kolvereid, 1999; Barringer, Jones and Neubaum, 2005). Entrepreneurial parents form a role entrepreneurial intention and entrepreneurship has also been explored in the context of personality traits (Kristiansen and Indarti, 2004). Success, control focus, and risk taking tendency are the personality traits, which are often associated with entrepreneurial behavior (Begley and Boyd, 1987; Lee and Tsang, 2001) and such traits are most commonly studied personality traits of entrepreneurial behavior (Phan et al., 2002).

The concept of financial literacy has begun to take its place in consumer education research and formations that began in the United States towards the beginning of the 1900s (Jelley, 1958). In his extensive literature review, Remund (2010) argues that the concept of financial literacy has been tried to be explained by a wide variety of contradictory definitions and values. In addition to the difficult nature of financial literacy, it is also used instead of other financial concepts such as financial education and financial information can be the reason for this complication (Huston, 2010; Kennedy, 2013). Moreover, the concept of financial literacy includes the concepts of financial information, financial attitude and financial behavior, and emerges as a results of the relationships between these three components (Jorgensen and Savla, 2010).

The lack of financial literacy at the national or individual level causes financial difficulties with the simplest narrative (Alhabeeb, 1999). The lack of financial literacy at the individual level can lead to insufficient financial resource management, poor money management, difficulty in making financial decisions, and poor financial performance, resulting in poor financial performance, financial dissatisfaction and deceptive financial behavior (Yew et al.,

2017) It is foreseen that the lack of financial literacy at the national level may lead to the negligence of consumers and investors, the increase of fraudulent activities and eventually the destabilization of the market which will damage economic growth. Empirical studies, however, show that the level of financial literacy in developed countries is low (Lusardi, Michaud and Mitchell, 2013), furthermore the consequences of inadequate financial literacy in developing countries can be more devastating. In these economies, the diversity of financial services is inadequate, and access to these services is limited which makes it more challenging for people when combined with deficits in consumer protection (Yew et al., 2017).

Research Model

Entrepreneurial and entrepreneurial candidates are expected to have certain competencies called entrepreneurial competencies in order to perform on successful entrepreneurial activities (Mitchellmore and Rowley, 2010). Financial literacy is also seen as one of the competencies that entrepreneur candidates must possess. Entrepreneurs must acquire skills such as financial literacy that will make them more productive in both life and financial matters. Financial literate individuals are better equipped with competencies that will increase their economic well-being. Entrepreneurs need financial core competencies such as being able to read the balance sheet, to make loans, to grow and / or keep them up, and to budget (Trunk and Dermol, 2015).

It is known that most entrepreneurs fear "financial management" because of lack of financial management information. This lack of information and fear contributes to the decline of entrepreneurship rates as well as the failure of new business establishments (Timmons and Spinelli, 2007). Researchers accept that entrepreneurs routinely make decisions about the acquisition and use of resources. Such activities almost always result in financial consequences and for this reason entrepreneurs must be financial literate in order to make sound decisions (Oseifuah, 2010). Recent studies have argued that "management capital" or business skills (including financial literacy) are key drivers of firm growth and key determinants of productivity (Bloom, Mahajan, McKenzie and Roberts, 2010, Bruhn, Karlan and Schoar, 2010). In sum, financial literacy has a significant contribution to entrepreneurial skills, especially for young entrepreneurs (Oseifuah, 2010; Wise, 2013).

In the light of this information, the following research model and hypothesis have been developed.

H1: There is a statistically significant relationship between financial literacy and the entrepreneurial intention.



Figure 1. Research Model

Methodology

The aim of this study is to determine the level of Financial Knowledge, Financial Behavior and Financial Attitude of Marmara University students and to examine their relationship with entrepreneurial intention. For this purpose, a part of the OECD INFE (2011) financial literacy questionnaire has been adapted and used. Entrepreneurial intention was developed by Linan and Chen (2009) and measures the concept with five questions by using five-point Likert scale. The questionnaire was distributed to the first year, fourth year and preparatory class during courses. A total of 1,500 surveys were distributed, but 1049 surveys that were filled in are taken into consideration for analysis.

The distribution of items in the questionnaire is as follows; Eight questions were used to determine the level of financial knowledge and eight Likert type questions were used to measure the financial behavior (five questions) and attitude (three questions). Finally, five questions were aimed to measure entrepreneurship intention. The level of financial knowledge is divided into simple interest, compound interest, inflation and so on. was used to measure the level of basic knowledge and the score obtained from the sum of the coded values, coded to be 0 for each correct answer to the questions and 0 for the wrong answer, was named Financial Information Point.

Eight Likert-type questions in the questionnaire were used to calculate the financial behavior (five questions) and attitude (three questions). The method used by Atkinson and Messy (2012) was followed in measuring financial attitudes and attitudes. Accordingly, the answers given to the questions of financial behavior are scored as "I totally agree " 5, "I do not agree at all" 1 in the range of 1-5. If the result of the scoring is "4 or 5", "1" is re-coded as "0" in other cases. The sum of the points of the questions is accepted as the Financial Behavior score. In order to find the financial attitude scores, averages of the answers given to the three related questions were taken. Entrepreneurship questions were the only dimension of factor analysis, and Cronbach alpha reliability was calculated as 0.993. The average of the five problems is calculated and entrepreneurship score is calculated.

The gender question was valid in 1040 questionnaires. 607 (58.4%) of the respondents were female and 433 (41.6%) were male students. The sample is distributed among the faculties as follows; 386 (41,6%) Faculty of Business Administration, 146 (14,1%) Faculty of Education, 133 (12,8%) Faculty of Engineering, 118 (11%, 4) Banking Insurance Higher School and 24.4% of the students are other faculties. 394 (37.8%) of the participants were in the preparation, 331 (31.8%) were in the first class and 317 (30.4%) were in the fourth grade.

In order to test mean value of Entrepreneurial Intention with respect to Gender independent t-test has been conducted. The equality of the Entrepreneurial Intention level with respect to gender are given in Table 1. Mean value of the Entrepreneurial Intention for female is 2.97 and standard deviation is 1.25 and mean value of Entrepreneurial Intention for male is 3.44 and standard deviation is 1.19. According to the test result male group have higher mean value of the Entrepreneurial Intention than the female group at 0.05 level of significance.

Table 1. Entrepreneurial Intention and Gender

	N	Mean	Std. Dev.	t value	p value
Female	579	2.97	1.25	-6.00	.000
Male	425	3.44	1.19		

Table 2 reports the findings related to faculty. Regarding to Education Faculty and Banking students' Entrepreneurial Intention mean value is statistically less than students in Faculty of Business Administration. There is no difference of the Entrepreneurial Intention mean value of the students of Education Faculty, Banking and Engineering.

Table 2. Entrepreneurial Intention and Students' Faculty

	N	Mean	Welch Value	p value
Business Administ.	375	3.41	7.33	.000
Education	135	2.92		
Banking	109	3.00		
Engineering	131	3.08		
		Mean Diff.	Std. Error	p value
Business Administ.	Education	.49	.13	.001
	Banking	.41	.14	.018
Education	Engineering	-.16	.16	.908
	Banking	-.08	.17	.997
Banking	Engineering	-.08	.17	.998

Table 3 presents the findings related with level of Entrepreneurial Intention and accommodation. Pairwise comparison showed that the students' who live with roommate have higher mean value of Entrepreneurial Intention level than both the students' who live with their family and students' who live in dormitory.

Table 3. Entrepreneurial Intention and Accommodation

	N	Mean	F value	p value
Family	495	3.09	4.805	.008
Dormitory	314	3.12		
With roommate	153	3.15		
		Mean Diff.	Std. Error	p value
Family	Dormitory	-.03	.09	.953
	With roommate	-.35	.12	.010
Dormitory	With roommate	-.32	.12	.033

The relation between Entrepreneurial Intention and income level is presented in Table 4. Pairwise comparison showed that the students' who have income less than 500 TL have

lower mean value of Entrepreneurial Intention level than the students' who have income level of 501 – 1000 TL and 1001 – 3000 TL. On the other hand, there is no significant difference between the students who have income between 501-1,000 TL and 1,001-3,000 TL.

Table 4. Entrepreneurial Intention and Income

	N	Mean	F value	p value
Less than 500 TL	280	2.96		
501 – 1000 TL	453	3.24	7.317	.001
1001 – 3000 TL	218	3.37		
		Mean Diff.	Std. Error	p value
Less than 500 TL	501 -1000 TL	-.27	.09	.015
	1001 -3000 TL	-.41	.11	.001
501 - 1000 TL	1001 – 3000 TL	-.13	.10	.428

As a result of multiple regression analysis, there was no statistically significant relationship between the level of financial knowledge and the of entrepreneurial intention. Financial behavior and financial attitude dimensions have statistically and positively contributed to the intention of entrepreneurship. The research hypothesis is partially accepted.

Tablo 5. Financial Literacy and Entrepreneurial Intention Multiple Regression Analysis

Dependent variable: Entrepreneurial Intention

Independent Variables	Beta	t	p
Financial Knowledge	.03	.82	.441
Financial Behavior	.25	7.81	.000
Financial Attitude	.11	3.60	.034
$R^2 = .064$; Adj. $R^2 = .062$; $F = 23.06$; $p = .000$			

Conclusion

In this study, the aim was to investigate the effect of financial literacy levels of university students on entrepreneurial intention. Statistically significant relationship between financial knowledge and entrepreneurial intention did not appear, however it was found that there was a statistically significant positive relationship between entrepreneurial intention and financial behavior and attitude. Although these findings seem to contradict each other, our findings suggest that individuals with financial attitudes and behavior have entrepreneurial intentions. There is no impact of financial knowledge on entrepreneurship without conversion to behavior or attitude.

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Effects of the 2008 Global Crisis on the Older Population in Turkey

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Abstract

Population aging in the world brings economical and sociological developments with it. Similar effect has started to be seen also in Turkey especially in the last 10 years with the impact of rapid urbanization. The elderly population is more vulnerable to crises because of dependency. In this study, an analysis was made by looking at the change in poverty level to understand how the old population in Turkey was affected by 2008 global crisis. In calculating the poverty by taking 60% of the median according to the equivalised individual income, the population over 65 years old was found the most affected age group by the crisis. The impact of the economic programs implemented in the crisis period on the elderly remains very limited. This would also bring about the problem of financial sustainability for possible future crisis times in Turkey where the population ages rapidly in the following 20 years period.

Keywords: Crisis and older population, aging, poverty and aging

Conference Topic: Macroeconomics

I. Introduction

Population aging especially in the developed countries brings economical and sociological developments with it. When figures are compared with 1950's data, it is evident that number of elderly population has raised 3 times and in 2013 it has reached 841 million (UNDP, 2013). In literature, the term "elderly" has been used for variety of age ranges. In "World

Population Ageing 2013” report, United Nations declared that the age of 60 and over should be accepted as ‘elderly.’ (UNDP, 2013). The age of 65 is accepted by World Health Organization (WHO) and it is the most commonly used ‘elderly’ definition.

Elderly population is more vulnerable to crisis because of their dependency that defines disadvantages status. Thus, 2008 financial crisis has affected many elderlies in variety of countries (AGE, 2012). It is clear that policies developed by governments are incapable of protecting elderly from impoverishment in times of economic crisis. For that reason, old individuals try different methods like reducing expenditures, working until late ages, selling their assets for legating less in order to prevent the disastrous effects of crisis (Hurd and Rohwedder, 2010).

As global financial crisis has affected all countries that are part of world economy, Turkey is affected too. So that, this has initiated the central government to take preventive measures and seven different policy frameworks are rolled out in 2008 and 2009. When these policy initiatives are examined, it is clear that most of the measures consists of macroeconomic precautions are taken to protect economic balance. Also, these precautions are taken for unemployment insurance, export subsidies and incentives that support producers and employment. So that there were no measures taken for elderly population. This situation has resulted that financial crisis has more destructive effects on aged people who is left vulnerable..

II. Literature Review and Poverty Risks of Older Population

It is observed that the elderly population in the world has increased because of the declining birth rate and the increase in life expectancy in birth in recent years. In the literature, the elderly concept is defined in different ways. UN defines the ages of 60 and older as ‘elderly’, 80 and older as ‘the oldest’ in the World Population Aging Report published in 2013 (UN, 2013, p.3). The OECD defines the elderly population as "people of ages 65 and over, consisting of a heterogeneous group whose behavior and needs change" (OECD, 1992). According to the UN's "Aging World Population: 1950-2050" study, the decrease in the fertility rate and the increase in expectation of life at birth have caused the aging of the resultant population.

Table 2.1. Age dependency ratio, old and population ages 65 and above in European Union, World and Turkey

	Country	1970	1980	1990	2000	2007	2008	2009	2010	2015	2050
Age dependency ratio, old (% of working-age population)	EU	18,2	20,6	20,6	23,3	25,4	25,6	25,9	26,2	29,4	53,4
	World	9,2	9,9	10,0	10,9	11,4	11,4	11,5	11,6	12,6	25,4
	Turkey	7,3	8,5	7,7	9,5	10,3	10,4	10,5	10,6	11,3	32,8
Population ages 65+ (% of total)	EU	11,6	13,3	13,8	15,7	17,0	17,2	17,3	17,5	19,2	29,8
	World	5,3	5,8	6,1	6,8	7,4	7,5	7,5	7,6	8,3	15,9
	Turkey	3,9	4,7	4,5	6,0	6,7	6,8	6,9	7,0	7,5	20,6

Source: Worldbank Databank, 2017 (Access Date: 20.08.2017)

As seen in Table 2.1, in the world, in Europe and in Turkey as the example of this study, the share of the elderly in the total population has increased over the years, making the elderly individuals more dependent on the working young population to cover their social insurance. It is also seen that the dependency ratio of elderly people have increased over the years.

The aging of the population puts the country's economy in more trouble during times of crisis. States have changed their pension policies after the 2008 crisis. The retirement age has been pulled up in many countries. In some cases, the amount cut off from those who want to retire early has been increased, and people have been forced to work until late ages. After 2008 financial crisis in Europe some governments have to change their pension policy because of critics on public expenditure. As a result of ageing populations, they are forced to take measures on pension crisis. For example, while Spanish government is going to change retirement age from 65 to 67 by 2017, Hungary changed from 62 to 65 by 2012. In Portugal benefits were frozen and special tax was added on high pensions. Also, Italy made equal of female to male retirement age to 65 (Casey, 2012, p.256).

Governments has to take some measures to prevent deepening of old poverty and the problems occurring as a result of this. Firstly, it is necessary to have minimum income and pension policy for old people. Secondly, it is emphasized that feminization of poverty is also important to provide equality in access to social protection. There should be taken measures against elder abuse and age discrimination in employment which can cause social isolation and poverty risk (AGE, 2012, p.12-16).

The problems caused by the aging of the population lead to the increase of the old poverty along with the crises. On the contrary, governments have taken measures to keep macroeconomic development and ignore old poverty. The other parts of the study will address the impact of elderly poverty and aging policies in Turkey, especially on the elderly poverty data after the 2008 economic crisis.

Table 2.2. At risk of poverty rate after social transfers according to age group (2006-2014)

	GEO/TIME	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total	European Union (27 count.)	16,5	16,6	16,5	16,4	16,5	16,8	16,8	16,7	17,2
	Euro area (19 countries)	15,6	16,1	16,1	16,2	16,3	16,8	16,9	16,7	17,1
	Turkey	26,7	24,7	24,7	25,3	24,4	23,5	23,7	23,1	23,0
0-15	European Union (27 count.)	19,9	19,9	20,1	20,0	20,6	20,3	20,2	20,0	20,7
	Euro area (19 countries)	17,5	18,2	18,8	19,3	20,4	20,3	20,1	19,6	20,1
	Turkey	36,7	35,0	34,5	35,6	33,9	32,7	33,9	34,1	33,7
16-64	European Union (27 count.)	15,0	15,1	15,0	15,1	15,6	16,2	16,6	16,7	17,3

	Euro area (19 countries)	14,2	14,8	14,8	15,1	15,6	16,4	16,8	17,0	17,5
	Turkey	22,5	20,9	21,0	21,6	20,8	20,0	19,8	19,1	19,1
65+	European Union (27 count.)	18,9	19,1	18,9	17,9	15,9	15,8	14,4	13,7	13,7
	Euro area (19 countries)	18,8	19,1	18,2	17,4	15,2	15,1	14,1	13,3	13,3
	Turkey	20,0	18,4	18,9	20,2	19,3	19,0	20,5	18,4	19,3

Source: EUROSTAT Database, EU-SILC Survey (Access Date: 22.08.2017)

III. Methodology and Data

In the study, the relative poverty threshold based on the income was calculated on the basis of the equivalised household disposable income that is consistent with the household size and structure by OECD norms. 60% of the median of equivalised household disposable income is defined as the poverty line. The households and individuals living below this border are considered poor. The calculation of equivalised income is based on the Eurostat scale, which is weighted as 1 household head, 0,5 individuals over the age of 14, 0,3 persons under 14 years of age. Thus, the effect of household size and composition is also included in relative poverty method. Equivalised per capita income formula (Eurostat) as follows;

$$Y_i = \frac{R_i}{(1 + 0,5 * N_y + 0,3 * N_c)}$$

Y_i: Equivalised per capita income, R_i: Household disposable income, N_y: The number of persons over the age of 14 excluding the household head, N_c: Number of persons at 14 years and under 14 years. In this study, for the 2002-2013 period, The Turkish Statistical Institute (TURKSTAT) household budget survey data covering Turkey as a whole are used. TURKSTAT has been conducting annual household budget surveys since 2002. Around 10 thousand households are surveyed each year, with changes taking place over the years.

Household incomes composed of 24 items in the surveys are examined under five main categories to measure the effect of the crisis on the household budget. These are; (i) wage income, (ii) income other than wages and social benefits, (iii) pension, (iv) old-age/widow and orphan's wage and finally (v) other social benefits. The first two are the incomes that households earn from their economic activities and assets, and the last three are regarded as benefits obtained by the state as social policies. The households were divided into three groups, households without 65+, households with individuals with 65+, and households with individuals only 65+.

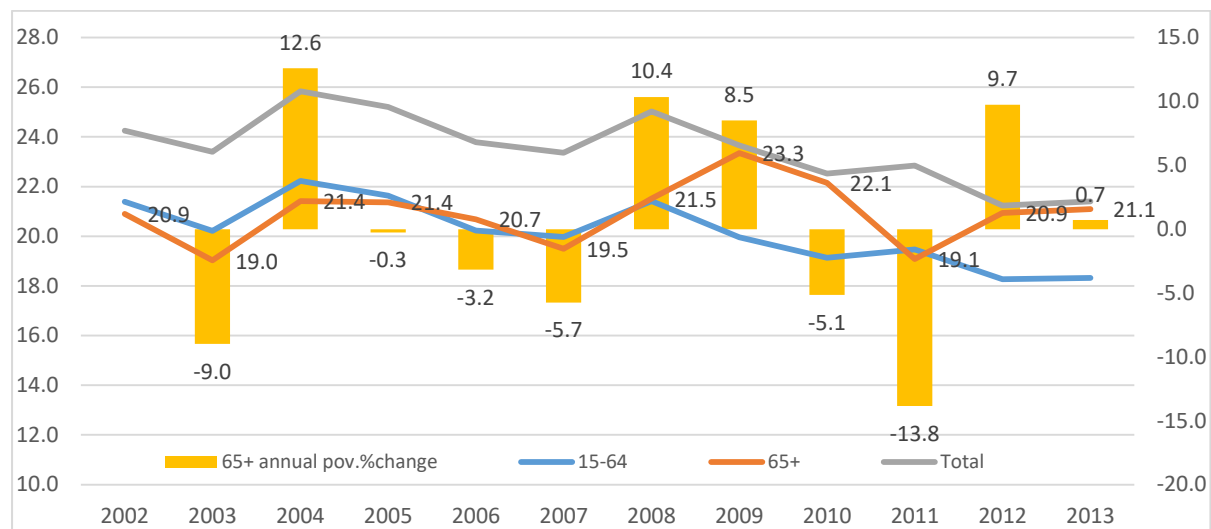
IV. Findings

IV.1 How Crisis Affect Turkish Economy: Growth, Poverty and Social Protection Expenditures

The solid economic growth performance achieved beginning with 2002, however, did not generate sufficient employment gains. The global crisis has shown itself mainly in the rapid decline in growth rates and in the increase in unemployment in Turkey. In 2009, The Turkish

economy contracted by 4.7% in 2009, which was considerably deeper in real terms. In this period, unemployment rates increased from 9% to 13.1%. The global crisis, which started to make effect on Turkey as of the second half of 2008 translated into steep deterioration in growth performance, increases in public debt, and rise in unemployment. In the mentioned period, Turkey's economy suffered economic contraction at a higher degree relative to a number of developing economies, leading to further increases in unemployment rate. (Yılmaz et al, UNICEF, 2010;6).

In Turkey, over 65 years of age poverty was realized below total poverty rate in 2002-2013 period. The total poverty rate ranged from 25.8% to 21.2%, while the poverty rate over the age of 65 was between 23.3% and 19.1%. With the deepening of the global crisis, the increase in the poverty rate over the age of 65 in Turkey was clearly above the other age groups and increased by 10.3% and 8.5% in 2008-2009 and rose up from 21% to 23.3% respectively. This is actually the highest rate in 2000 years. Hence, the crisis showed both its influence at a higher level in this age group and the increase in the level of poverty during the crisis continued.



Graph 4.1. Poverty Rates of Age Groups and Poverty Change Ratio of 65+

The fiscal policies implemented in the crisis period, especially since 2009, decreased the level of general poverty rate, but this effect was not seen in the population over 65 years. In the post-crisis period, the poverty level decreased with the fast recovery of the economy, but this effect was more limited in the 65-year-old population and remained above 1.6 points in the pre-crisis period compared to 2013. Turkey uses public social protection expenditures predominantly for the elderly population. When we compare the social protection public expenditures with EU countries. Second level breakdown of social protection and social security expenditures reveal that almost 80% of mentioned expenditures go to elder citizens. This ratio for EU is 45.8% in average. The ratio of social protection expenditures delivered directly to household and children is 0.5% in Turkey and 8.4% in EU in average (Yılmaz, 2017).

IV.2 Impact of the Crisis on the Elderly Population in Turkey

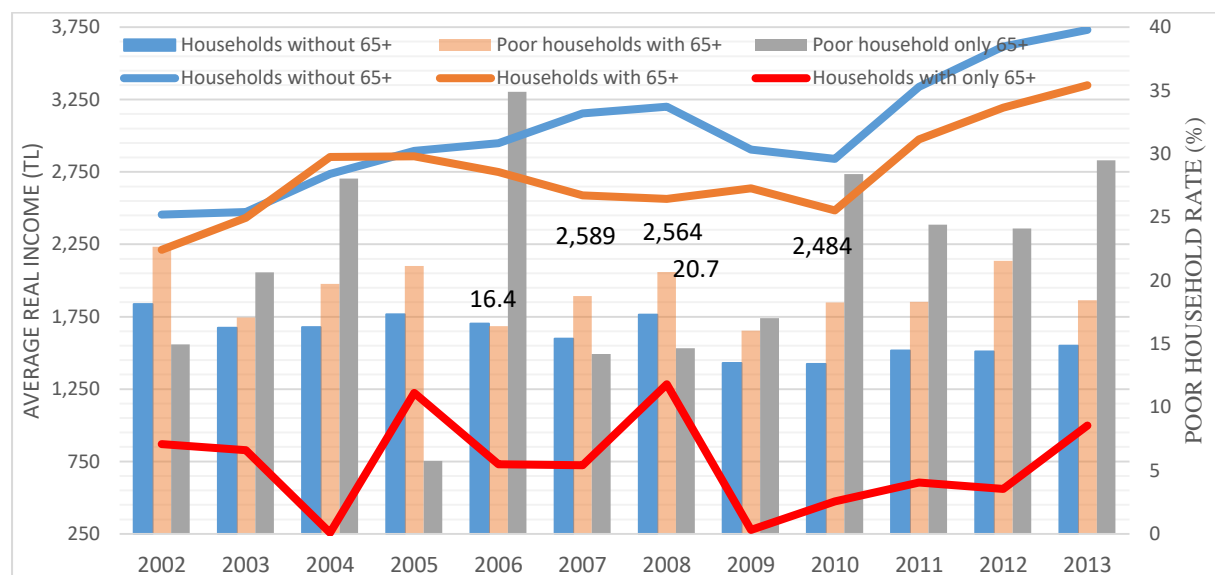
In Turkey as a fundamental issue, dependency on retirement and old-age pensions was calculated at a very high level of over 50% in the households with 65 year old age member. Here we measure dependency in two ways; the first measure included the share of income from retirement and old age in total incomes, excluding social benefits, and the second measure was the share of total incomes, including social benefits. This result clearly shows us that dependency on income from elderly people is high in both poor and not poor household.

In this part of the study, households will be analyzed according to five income items explained in methodology part, and in particular the crisis period data will be examined in detail to observe how old poverty changes.

Households with Wage Income

Poor households with 65 years of age had a significant decrease in real wage income per household during the crisis period. In the continuation of this development, the proportion of poor households with 65 years of age in the total number of 65 years old households increased to 20.7% in 2008 with a considerable increase from 16.4%. Therefore, in the crisis period, the number of poor dwellers with a 65-year-old population increased as the real wages decreased. The decline in wage income has been the main determinant of the poverty increase in the households with a 65-year-old population in this period. As a matter of fact, we see that there is a partial decline in the wage income of the non-poor households with 65 years old. Approximately 80 thousand households, whose wage incomes decreased, fell below the poverty line in this period.

Another striking development experienced during the crisis period is the high rate of increase in the number of households that have a wage income of 65 years old. In the period of 2006-2008, this rate of increase in the number of poor households with 65+ age group increased up to 50%. This shows that the number of households which have wage income increased during the crisis period and these households started living together.



Graph4.2 The real wage income per household according to the type of the households under the poverty line (TL) (Household Budget Survey, TURKSTAT, 2013)

The increase in the unemployment rate experienced during the crisis in Turkey and the low factor productivity and widespread informal employment that deepened this unemployment have been the main determinants of real depression in wages. The following table shows the unemployment rate above 15 and the unemployment rate above 65. The general unemployment rate, which was 9.0% in 2006, reached 13.1% in 2009 and the number of unemployed, which was less than 2 million in 2006, exceeded 3 million. A similar picture applies to individuals over 65 years of age. The large increase in unemployment between these individuals with the crisis, which was 0.8% before the crisis, increased the risk of poverty among elderly individuals.

Households with Pension Income

During the crisis period, the average pension incomes decreased especially in the households with 65 years old. Compared to 2007, the real rate of decrease is 20%. In the same period, real pension incomes of households which had only 65 years old individuals decreased by 10%. This differentiation in the average pension income can also be seen as a consequence of the merging of the households we discussed in the previous section. In the households above the poverty line, a similar fall in pension income was not observed. This was considered an expected result of the differentiation of pension levels.

Households with Old-Age/Widow and Orphan's Wage

Old-age, widow and orphan pensions had a decline in their real incomes in 2007, in the following period these incomes showed a partial recovery. However, the increase in the number of households with 65+ years old below the poverty line has increased by almost one fold over other groups. This means that the number of the pensioners who receive old pensions and are below the poverty line increased significantly during the crisis period due to the influence of other determinants (wages, other incomes, etc.). According to SGK data, 927 thousand people were receiving old-age pensions in 2006 and this number decreased to 867 in 2008 and 859 in 2009. Despite the crisis period, this decrease is evidence of the household consolidation seen in the crisis period, which mentioned before. Because old-age pension is given not according to personal income but according to household income. These revenues, which are less affected from the crisis period, decreased because of the policies related to pensions in some periods after the crisis.

Households with Other Social Benefits

The incomes of the poor households from other social assistance during the crisis period also decreased for the 3 households evaluated. According to the household income, the income of households with old individual decreased from 837 TL in 2007 to 645 TL in 2008. The income of households with only 65 years old individuals came to a bigger decline. While their income was 779 TL in 2007, it fell to 393 TL in 2008. The great decline in this type of income, along with the crisis period, caused many households to fall below the poverty line, and in subsequent periods, households which incomes came from other social benefits remained largely below the poverty line. The rate of the poor households which earn this

income increased from 15.9 in 2006 and 18.4 in 2007 to over 30% in the crisis and maintained at the same levels after the crisis. This shows that poorer societies are largely dependent on other social assistance incomes.

V. Conclusion

Population over 65 years old was found the most affected age group by the crisis in Turkey. The impact of the economic programs implemented in the crisis period on the elderly remains limited due to nature of the crisis and lack of fiscal policy measuring effects of the crisis on the household with 65+. As dependency on retirement and old-age pensions in Turkey is very high level of over 50% in the households with 65 year old age member, any policy change for the elderly directly affects the income level of those families.

Study shows that in household below poverty line, social benefits together pensions with stand out as an important determinant at the crisis period. Poor households with 65 years of age had a significant decrease in real wage income per households.

Beside real wage decrease another striking development experienced during the crisis period is the high rate of increase like up to 50% in the number of households that have a wage income of 65 years old. This tells us the number of households which have wage income increased during the crisis period and these households started living together.

During the crisis, the average pension incomes decreased in the households with 65 years old. Compared to 2007, the real rate of decrease is 20% which was crucial especially households close to poverty line. The incomes of the poor households from other social assistance during the crisis period also decreased. The income of households with only 65 years old individuals came to a bigger decline. The great decline in this type of income, along with the crisis period, caused many households to fall below the poverty line, and in subsequent periods, households which incomes came from other social benefits remained largely below the poverty line.

The impact of the fiscal policy measures focusing on the general policies was limited due to the fact that already more than 80% of the social benefits are used by the elderly. This would also bring about the problem of financial sustainability for possible future crisis times especially in terms of social programs in Turkey where the population ages rapidly in the following 20 years period.

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The Impact of the EU Accession on the Institutional Quality in Poland

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Abstract

The aim of this paper is to assess whether the EU accession had an impact on the quality of institutions in Poland. Such a membership should improve institutional quality through both direct (the necessity to adjust regulations to EU standards) and indirect (for example, through an increased international trade or capital flows) channels. The author applied the Synthetic Control Method (SCM) to compare the actual levels of institutional quality (measured by the Rule of Law index provided by the World Bank) with the counterfactual values based on the assumption the Poland had not entered the EU. The obtained results indicate that the EU membership led to levels of institutional development that were above those calculated in the counterfactual scenario. In other words, Poland has had higher quality of institutions than it would be if the country remained outside of the EU.

Keywords: European Union, institutions, treatment effect

Main Conference Topic: Economics

Introduction

The institutional quality has become one of the most important topics in economic literature. Many researchers investigate the role institutions play in economic growth and development (see, among others, Hall and Jones, 1999, Acemoglu et al., 2001, Rodrik et al., 2000), the formation of trade patterns and comparative advantage (Costinot, 2009) or procyclicality of fiscal policy (see Alesina and Tabellini, 2000, Persson, Roland and Tabellini, 2006, Von Hagen and Harden, 2005, to name but a few).

At the same time, our knowledge about the determinants of institutions is still incomplete. However, the current state of economic knowledge can be used to state the following factors may influence institutions:

- a) economic development – see, for instance, Rigobon and Rodrik, 2004,
- b) income distribution – see, Alesina and Rodrik, 1993, as an example,
- c) international openness – see, among others, Rigobon and Rodrik, 2004,
- d) education – more in, for example, Glaeser and Saks, 2006.

The role of international openness is especially worth analyzing. In many cases countries liberalize trade and/or capital flows when they become members of bigger economic blocks. In case of the European Union (EU) countries that wish to enter that organization must not only liberalize trade and factor movement, but also adopt certain regulation and political and legal rules. Bearing that in mind, in this article I verify whether the EU membership might have an impact on institutional quality. In other words the aim of

the paper is to assess if economic integration in Europe – in the form of the EU accession – can stimulate improvement of the quality of institutions.

The country that is analyzed is Poland. Being a post-communist state, Poland has made a great strides in improving its level of institutional development. However, apart from economic and political transformation, the integration with the EU was seen as the way that itself may lead to the adoption of better legal and political norms, regulations and practices.

The structure of the article is as follows. The first section is the overview of the literature. In the second section, I describe the institutional quality in Poland, measured by the Rule of Law index. The third section presents the data and applied method. Main findings form the fifth section of the article, while the sixth section concludes.

Related work (alter the title to meet your paper requirements)

Many researchers have conducted analyzes of the relationship between institutional quality and international openness, usually seen as openness to international trade. It seem that both-variables are correlated, hence it is vital to bear in mind that there are two possible directions of such a relationship. However, there are many studies that prove that while institutions affect openness, at the same time they are determined by trade. It is especially important for my analysis, since the aim of my study is to assess the impact of the EU membership (that may be seen as an example of trade liberalization) on the quality of Polish institutions.

It may be argued that trade leads to more dynamic and competitive environment and by doing so it leads to lower opportunities to conduct rent-seeking activities. Moreover, trade leads to learning and adoption of foreign practices.

In one of the most important papers on the quality of institutions, Rodrik et al. (2002) prove that openness positively affect such a quality. Rigobon and Rodrik (2004) confirm a positive relationship between trade openness and the rule of law. Islam and Montenegro (2002) control for development level and prove that openness has an impact on several institutional quality variables.

One of the most commonly investigates aspects of institutional development is the prevalence of corruption. Although the causality between trade and is yet to be established, it may be argued that in more competitive markets economic rents are lower and illicit payments may therefore also be lower. Since openness fosters competition, corruption levels may fall after trade liberalization. Ades and Di Tella (1999) support empirically that hypothesis. They found that the ratio of imports to GDP has a significantly negative effect on corruption. What is more, Wei (2000) found that openness is positively related to wages in a public sector. One may expect that higher wages lower the incentives for officials to accept bribes. In this con-text trade openness may again have a negative impact on corruption.

Institutional quality in Poland

In order to describe the quality of institutions in Poland I used the Rule of Law index calculated by the World Bank. Before assessing the impact of the EU accession of that measure, it is worth analyzing that measure itself.

Polish Rule of Law index achieved its lowest level in 2006 (0.405) and the highest (0.858) in 1998. As Figures 1 and 2 present, there were some transitory variations in the value of the measure, and by decomposing the time series (using the Hodrick-Prescott filter with usual parameters for yearly data) one is able to obtain its trend and cyclical component. It can be seen that Poland experienced an almost non-interrupted downward trend after 1998 and before the EU accession trend. In the following years one could observe the reversal of that trend.

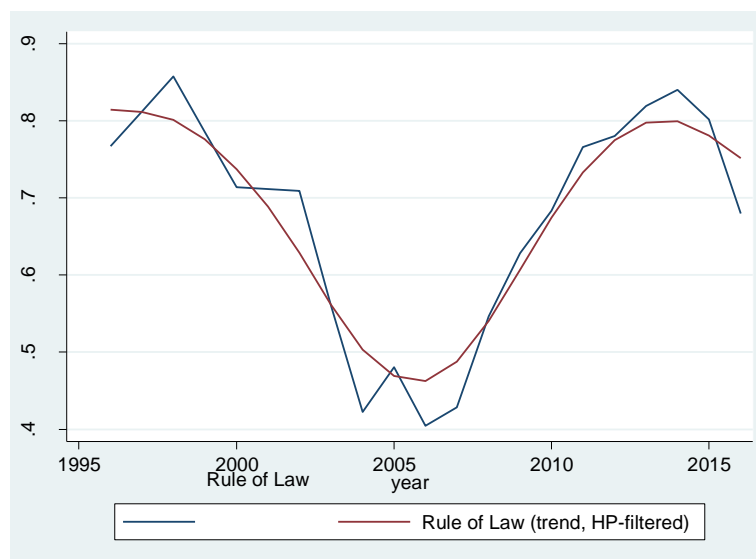


Figure 1: Rule of Law index and its trend – Poland, 1996-2016

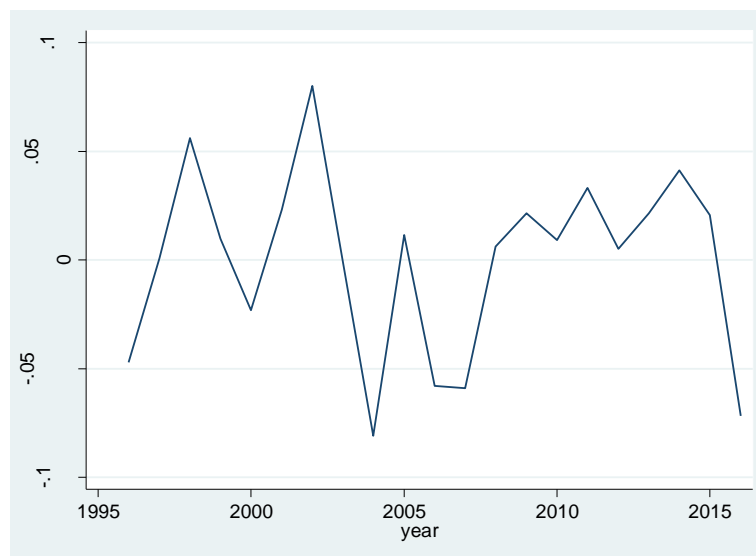


Figure 2: The cyclical component of the Rule of Law index – Poland, 1996-2016

The time horizon of the whole analysis may be split into two sub-periods – before and after the accession. Tables 1 and 2 provide us with basic descriptive statistics for the Rule of Law index in Poland

Table 1: Rule of Law in Poland – descriptive statistics

Period	1996-2016 (the whole sample)	1996-2003 (before the accession)	2004-2016 (after the accession)
Mean	0.676	0.740	0.637
Standard deviation	0.146	0.090	0.163
Coefficient of variation	21.63%	12.11%	25.60%

Table 2: The trend component of the Rule of Law in Poland – descriptive statistics

Period	1996-2016 (the whole sample)	1996-2003 (before the accession)	2004-2016 (after the accession)
Mean	0.676	0.728	0.645
Standard deviation	0.126	0.093	0.137
Coefficient of variation	18.68%	12.84%	21.20%

Data and methodology

The outcome variable of the presented study was the quality of institutions measured by the Rule of Law index. It is commonly used indicator of general institutional quality or institutional development. It can be obtained in the Worldwide Governance Indicators database provided by the World Bank. In order to avoid any idiosyncratic shocks to quality of institutions, the study was based on the trend values of that indicator calculated by the use of Hodrick-Prescott filter.

The Synthetic Control Method (SCM) that was applied in the study makes the comparison between actual and counterfactual values of an outcome variable. It may be seen as the generalized version of the Difference-in-Differences estimator. However, instead of comparing a treated unit with any real control unit (and sometimes it is hard to find the proper control unit), it compares a given treated country/region/firm etc. with the synthetic control unit. By construction, it may lead to serious problem linked to the choice of control set of countries (or other units). As discussed in Campos, Coricelli and Moretti (2014), the control sample cannot include countries that may be affected by the treatment.

In the study data on institutional quality for years 1996-2016 were collected. The World Bank provides data for years 1996, 1998, 2000 and 2002-2016, hence three values (for 1997, 1999 and 2001) were missing. I filled those gaps with the use of arithmetic progression. Institutional quality seems to be persistent and relatively stable. That is why the arithmetic progression may be considered as the best method than might be applied to calculate lacking values in the time series. I used the data for all countries from the database, except for countries with more missing data and members of the UE (since control group should not be

affected by treatment). Eventually, 170 countries were included in the sample – Poland (treated unit) and 169 other countries being the donor pool for the control group.

The covariates were lagged values of the outcome variable. I used them due to the fact that institutional quality is rather persistent, hence that variable is autocorrelated. However, since the inclusion of all pre-treatment outcome values would lead to biased estimates, I only used (as covariates) the 1996, 1998 and 2003 values. 1996 and 2003 were the bound of the whole pre-treatment time period, hence their utilization led to better fit in the beginning and the end of that period. 1998 was the year when HP-filtered Rule of Law index In Poland achieved the highest value.

In the research, the SCM, thoroughly illustrated by Abadie, Diamond and Hainmueller (2010), was applied. The method can be described as follows.

Let us assume that we analyze $J+1$ units in T periods and unit zero was affected by some kind of treatment (e.g. the EU membership) in period T_0 . Then units $1, \dots, J$ are the control sample and the effects of treatment may be observed only for unit zero for periods T_0, \dots, T , while they remain unobserved in periods $0, \dots, T_0-1$. Let Y_{it} be the observed variable with two outcome values: Y_{it}^N (without the effect of treatment) and Y_{it}^I (with treatment effects included). Let us define D_{it} as a binary function and Δ_{it} as the difference of two potential outcomes for country i in period t . Then:

$$Y_{it} = Y_{it}^N + \Delta_{it}D_{it} \quad (1)$$

$$\Delta_{it} = Y_{it}^I - Y_{it}^N \quad (2)$$

$$D_{it} = \begin{cases} 1 & \text{if } i = 0 \text{ and } t = T_0, \dots, T \\ 0 & \text{otherwise} \end{cases} \quad (3)$$

The SCM is based on the idea that one may model the potential neutral outcome for post-treatment periods, while taking empirical outcomes as treated ones. It means that Δ_{it} is the measure of the treatment effect. The model for the neutral outcome can be summarized as follows.

$$Y_{it}^N = \delta_t + Z_i\theta_t + \lambda_t\mu_i + \epsilon_{it} \quad (4)$$

where δ_t is an unobserved common, time-varying factor, $\lambda_t\mu_i$ are heterogeneous responses to multiple unobserved factors, Z_i are covariates with time-varying parameters θ_t , and ϵ_{it} represents an error term.

The SCM compares pre-treatment outcomes and characteristics of unit zero and the control sample, and creates a set of weights that make it possible to build the synthetic unit zero as a weighted average of the control sample units. The weights need are non-negative and sum up to 1 to ensure that the synthetic unit zero lies within the convex hull of the control set – that is why it is important to collect the control group bearing in mind that unit zero is not an outlier in the entire sample of analysed countries (Fremeth, Holburn and Richter, 2013). The pre-treatment outcomes and characteristics for synthetic unit zero should be able to reproduce the actually observed unit zero parameters. Let us define Y_{ik} , with $k=1, \dots, m$ as a family of linear functions of the pre-treatment outcomes. In such a case one can formalise the condition for optimal weights as below.

$$\mathbf{W}^* = (w_1^*, \dots, w_J^*); \sum_{i=1}^J w_i^* Z_i = Z_0, \sum_{i=1}^J w_i^* Y_i^1 = Y_0^1, \dots, \sum_{i=1}^J w_i^* Y_i^m = Y_0^m \quad (5)$$

If condition (5) is met, we would obtain an approximately unbiased estimator of the Δ_{it} for unit zero.

$$\hat{\Delta}_{0t} = Y_{0t} - \sum_{i=1}^J w_i^* Y_{it}, t = T_0, \dots, T \quad (6)$$

However, in reality it is almost impossible to find such a weight combination. Yet, let us take a vector of characteristics of the treated country \mathbf{X}_0 , defined as $(Z_0, Y_0^1, \dots, Y_0^m)'$ and a matrix of the same characteristics for the J control sample countries \mathbf{X}_J . Estimator (6) holds when we choose a weight vector that solves the following optimization problem:

$$\mathbf{W} = (w_1, \dots, w_J); \forall_{i=1, \dots, J} w_i \geq 0 \wedge \sum_{i=1}^J w_i = 1 \quad (7)$$

$$\hat{\mathbf{W}} = \min ||\mathbf{X}_0 - \mathbf{X}_J \mathbf{W}|| \quad (8)$$

Condition (8) is a general one. The distance between \mathbf{X}_0 and $\mathbf{X}_J \mathbf{W}$ could be expressed using a quadratic form:

$$\hat{\mathbf{W}} = \min \{(\mathbf{X}_0 - \mathbf{X}_J \mathbf{W})' \mathbf{V} (\mathbf{X}_0 - \mathbf{X}_J \mathbf{W})\} \quad (9)$$

\mathbf{V} represents a symmetric and positive semi-definite matrix which can be interpreted as a measure for the relative importance of characteristics included in the \mathbf{X}_0 vector and \mathbf{X}_J matrix (Campos, Coricelli and Moretti 2014). The choice of \mathbf{V} is arbitrary, but it is a common practice to choose \mathbf{V} that minimises the mean squared error in the pre-treatment period.

Results

In order to apply the SCM procedure I used 'synth' command in STATA. Our outcome variable was an ECI trend – the ECI time series smoothened with Hodrick-Prescott filter. Our choice of covariates was based on Hausmann, Hwang and Rodrik (2007). To obtain a better fit pre-treatment outcome values were used as covariates. However, as stated by Kaul, Klößner, Pfeifer and Schieler (2016), one should be cautious, since controlling for all pre-treatment outcome values leads to a bias of the synthetic counterfactual in the post-treatment period.

Filtered Polish Rule of Law index was characterized by a strong downward trend throughout the whole pre-treatment period. The entry into the UE was accompanied by the reversal of the trend. However, the outcome value started increasing around 2005 – one year after the accession. At the same time, one should be aware of the fact that indicators of institutional quality are strongly subjective and are influenced by their past values and past events. In other words, in order to assess the institutional quality in Poland in 2004, one should check the values of Rule of Law index in following years. That is why, I checked the results of the implementation of the SCM when treated year is set as 2005, since it better shows any change in institutional quality in 2004. The results strongly support the hypothesis that the EU accession helped Poland achieve higher levels of institutional quality that it would be in case of remaining outside of the EU. The results of the SCM procedure are presented in Figures 3 and 4.

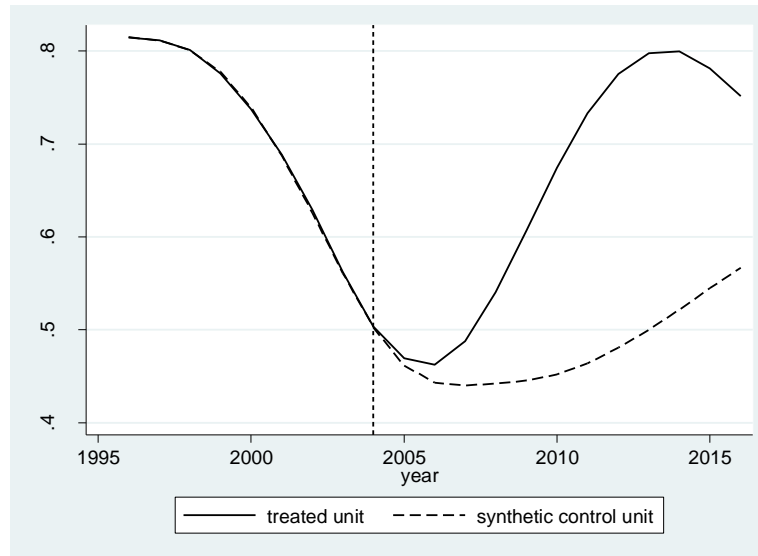


Figure 3: Synthetic and actual values of filtered Polish Rule of Law index (treatment year: 2004)

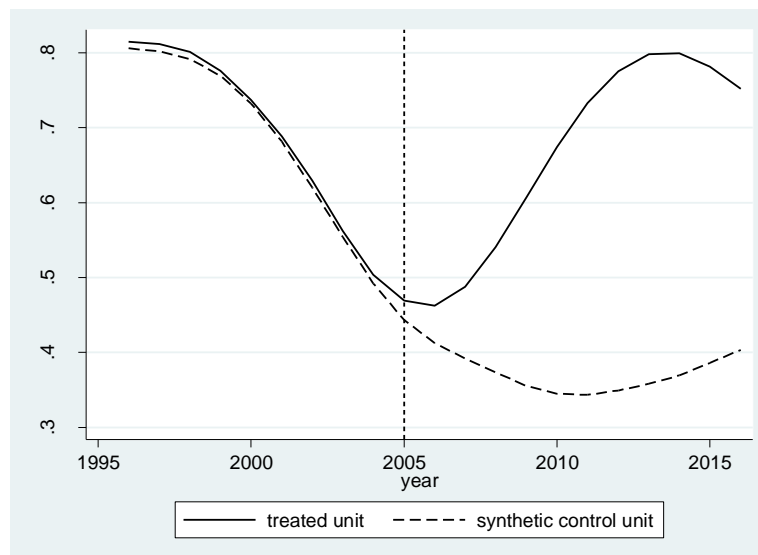


Figure 4: Synthetic and actual values of filtered Polish Rule of Law index (treatment year: 2005)

Synthetic Poland has a very good fit in reference to the ECI values, which is the proximity of the controlled actual and synthetic ECI values. It seems that synthetic Poland fits actual Poland well in the entire pre-treatment period, which means that it may be a good reference point in the post-treatment years.

Conclusion

The aim of the article was to assess whether the EU membership may have stimulated the quality of Polish institutions. The study was conducted with the SCM, which made it possible to calculate what might have happened had Poland not accessed the EU. The comparison between actual and counterfactual values of Rule of Law index indicates that Poland achieved higher valued of that measure than it would be in case of remaining outside of the EU.

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Public vs. non-public universities in Poland: An assessment of their technical efficiency

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Abstract

There have been substantial changes in the Polish university level educational system in the last 25 years. These changes, along with changes in governmental policies towards higher education, form a competitive and fast changing environment. Rankings of “quality” of schools are available. Less attention is dedicated to the examination of efficiency of universities. This paper discusses technical efficiency of public and non-public schools with the Data Envelopment Analysis technique. Despite fundamentally different context within which the two types of universities operate, there is no substantial difference in their technical efficiency, nor with respect to the components of this measure. Such a result forms the basis for suggested actions that may be undertaken in order to improve some aspects of the educational system in Poland

Keywords: higher education, technical efficiency, Poland, DEA

Conference Topic: Management - management education, training and development

INTRODUCTION

The Polish higher educational (HE) system has radically changed since 1989. This is due to a high number of established non-public schools¹, and an influx of persons wishing to pursue their education. In 1990/1991 there were 390.400 students, 1.953.800 in 2005/2006 (Szkolnictwo.... 2013, p. 5), and 1.348.800 in 2016/2017 (Concise...2017, p. 200). There is an expected decrease in enrollment in the near future, and the forecast for 2023/2024 is 1.254.000 students, or 68% of 2005/2006 academic year (Szkolnictwo...2013, p. 8). Such a decline is likely to intensify competition for students between universities. Some, mainly non-public universities will be eliminated from the market. Such an assumption does not hold true with respect to public universities: these are protected by governmental policies, within currently promoted strategies of regional development and scientific/technological development of the country.

¹) The notions public and non-public outlets/schools follow the official terminology used in Poland. The notions school, university, academia, and institutional outlet/unit are used in this paper as synonyms, even though formally there are rules that determine which word is appropriate to term the unit as school/university/academia. The higher education system, or high-schools are referred to university type educational system in Poland.

Concurrently, perceptions about the need to acquire knowledge change quickly. It may be expected that holding a diploma will not meet expectations of students and market demands. It is a common belief among young people in Poland that HE will not bring them desired life benefits, so consequently, the number of students may decrease. According to the survey by the Central Agency for Public Opinion Surveys 57% of respondents have “the diploma of an university has low value on the job market (Komunikat z ...2013, p. 7). However, it may also be expected that more and more attention will be paid by those considering studies, students, prospective employers, school management, etc. to:

- the quality of education, that is frequently associated with the perceived prestige of the granting institution;
- skills acquired during studies that meet market demands;
- technical efficiency of HE outlets, based on the common in the contemporary economy pattern, that can be traced to works of E.Deming: the higher efficiency, the higher the quality, the higher the effectiveness.

The subject of HE schools’ efficiency and effectiveness (at times used as synonyms) in Poland has started to gain attention. It is believed that the evaluation of efficiency/effectiveness of universities metric is difficult (Morawski 1999, p. 136), mainly because it is associated with non-material nature of knowledge. Indeed, investments in creation and transformation of knowledge can be estimated: the educational effects are more difficult to quantify. Attention is drawn to analyzing the effectiveness of spending public funds (Wolszczak-Derlacz 2013, p. 27), since the public wants evidence of their taxes being spent wisely, and that education contributes to the improvement of their standard of living. Questions of effectiveness stimulate thinking about management and control of institutions in the educational system. However, the primary focus of such assessments is on the public schools (Brzeziński & Wolszczak-Derlacz, 2015). Because of availability, and confidentiality of information in some cases, situation in non-public outlets is not explored.

One of the items needed to improve the HE relates to the question whether the higher ranking of public universities as compared to the non-public is a manifestation of greater technical efficiency of public ones. The development of non-public HE institutions is substantial, considering they receive less state funding than public ones. Moreover, the universities’ stakeholders often have objectives and therefore, different perceptions as to what is good or not. Non-public HE institutions need to demonstrate high efficiency in order to survive in markets where they do not have comparable conditions to compete with public universities.

The objective of this report is to identify and compare the technical efficiency of public and non-public universities. Issues of allocative efficiency are not discussed in this paper, and it is accepted that universities exist mainly to disseminate and create knowledge.

The paper is organized as follows. Part two provides an overview of the context relative to the pattern of students enrolled, and the number of public and non-public schools in Poland. Part three provides a description of the methodology and the data set used. Part four presents the examination results of technical efficiency of the universities studied. Part five describes the conclusions and outlines suggestions for further studies.

The context of the polish education system

The increase of number of students, along with specific changes in regulations had led to the development of a non-public educational sector. In the 2010/2011 academic year, there were 460 public high schools in Poland, while in 2016/2017 that number went down to fewer than 400 (Concise...2017, p. 199). The diminution of schools is linked to the establishment and closure of non-public schools. There are 255 non-public school in 2018 (Rejestr uczelni 2018). Such changes increase the competition in the market, which is likely to stimulate the increase of quality and efficiency. This is particularly true of non-public institutions.

People pay expenses on HE whether directly or indirectly. The government distributes and assigns funds through regulations. Levels of funding are continuously increasing. This increase however, should be put into the context of HE in other countries:

- university education meets the needs of a competitive economy (WCY, 2017, table 4.5.15 survey): Switzerland 8.88 is ranked first; Poland 5.47 is ranked 37 out of 63 countries;
- total public expenditure on education per capita (WCY, 2017, Table 4.5.02): 1. Luxemburg \$ 4 820; 37. Poland \$ 745;
- percentage of total first university degrees in science and engineering (WCY, 2017 – data from 2012, table 4.3.110): 1. Singapore 58.80; 38. Poland 26.53%;
- total public expenditure on education % of GDP (WCY, 2017, Table 4.5.01; in 2013): 1. Denmark 7.7%; 23 Poland 5.4%;
- total public expenditure on education per capita in 2013 (WCY, 2017, Table 4.5.02): 1. Luxemburg \$ 6 272; 34. Poland \$ 718.

Thus, even though Poland is catching up in terms of dedication to university type education, it is still far behind the leading economies in the world. It is not the only problem. Marklund et.al (Peer Review..... 2017, pp. 14-16) in the report for European Commission, have admitted weaknesses of the HE system in Poland. They point out to seven areas that call for a fundamental restructuring in order to guarantee a sufficient, professional and executive leadership in public institutions. One of the main recommendation is concentration on improvement of efficiency and effectiveness of institutions in the educational sector. The other important messages are supporting quality and consolidations that point out crucial weaknesses of Polish education system.

Several other items call for attention when the HE system in Poland is examined:

- public schools are more popular among Polish people: have higher prestige (reputation), than non-public schools;
- public schools are considered to be “better”, and diplomas from these institutions offer better job, an assumption that may be incorrect, and certainly calls for further explanation;
- 77.3% of public universities’ budget is associated with teaching and is covered by the state; 14.9% is attributed to research, whereas in non-public units it is 85,7% and 4.4% respectively.

On the funding side, for public units 81.3% is from the state budget and 11.3% from tuition fees. In non-public units, it is respectively 12.1% and 83.4%. Such a structure of income/funding provides a competitive advantage to the public sector over the private (Higher Education2017, pp. 47-51).

The above explanations provide evidence that the situation in the Polish HE system, though it is beginning to stabilize, has been quite precarious when looking at the number of schools

and the percentage of enrolment. The pattern of disparity in the “ease of doing business” seems to be established. Though due to divergent reasons for pursuing public education over non-public education, the issue of technical efficiency may gain importance. Firstly, governments will have the opportunity to demonstrate their own interests align with taxpayers’ interests, and in the second to survive, and bring school owners desired outcomes. The question of technical efficiency in public and non-public schools can be addressed with the use of Data Envelopment Analysis.

Methodology and the data set used

From a micro-economic perspective, question of technical efficiency (EFF) of universities epitomizes the concept of Pareto-Koopmans efficiency (eg. Varian, 2002), related to the ability of an unit to minimize the intensity of inputs required to produce the maximum set of outputs: “an unit is fully efficient if and only if it is not possible to improve any input without worsening output” (Cooper et.al, 2006, p.45).

This study utilizes the DEA technique (eg. Coelli et al. 2005; Cooper et al. 2006) to model the current levels of technical efficiency of 85 universities in Poland that have the authority to grant doctoral degrees. Such universities will be referred to as Decision Making Units (DMU) in this part of the paper. The DEA technique permits the examination of whether DMUs that fulfill the technical efficiency definition form a benchmarking frontier by which all DMUs can be compared and evaluated. “The primary advantage of using the non-parametric approach over that of other concepts (composite indexes, for example) lies in the modelling of the relationship between the inputs and outputs (if such are identified) that does not require the assignment of predetermined weights, based upon a single optimised mean-performance assumption.” (Nasierowski and Arcelus, 2015, pp.72-73). Within this context, EFF relates to the minimal resource endowment needed to produce a set of outputs. Benchmark universities have an EFF of 1.00. For others, EFF is measured in terms of how much other universities must reduce their input consumption in order to produce outputs comparable to their counterparts.

For the EFF formulations, an input orientation is used, consistent with the belief that universities can better control inputs than outputs. “Input saving measures of technical efficiency ... where benchmark DMU... are those that produce a given level of goods and services with the lowest resources or lowest cost” (Färe & Grosskopf, 1998, p.1). “[DMU] are efficient if they are on the boundary of the best practice frontier (BPF). In some cases however, these benchmark [DMUs] may not be using the fewest possible inputs to produce their output” (Färe & Grosskopf 1998, pp. 15-16).

The technical efficiency decomposition begins with the comparison between the efficiency measures under Constant Returns to Scale (CRS) relative to those under Variable Returns to Scale (VRS). One component, Congestion (CON) measures the deviation of each DMU from the Strong Disposability (SD) assumption. Another component, Returns to Scale (RS) measures deviation from the CRS. Whatever is left, residual, is usually labeled as Pure Technical Efficiency (PTE), and represents the unaccountable departure of each DMU away from the Best-Practice Frontier (BPF). The result is the decomposition of the technical efficiency of each DMU under CRS and SD, as the product of three components:

$$EFF = RS * CON * PTE \quad (\text{Färe et al. 1994, ch. 3}). \text{ In short:}$$

RS refers to the rate of change in inputs utilized as compared with the rate of change in outputs obtained. The value of RS may also be a result of complexity of coordination of different activities and the sophistication of areas of activities. CON refers to additional resources needed to eliminate excess inputs that could have otherwise been used to generate more outputs, or in other words, congestion exists when increases in one or more inputs can be associated with decreases in one or more outputs. Low congestion index therefore represents over-investment, or a waste of resources. PTE refers to other unexplained items that may influence the efficiency of the system.

The quest is the efficient use of resources: one can spend a little and achieve something, or one can spend a lot and achieve the same something. The key mathematical DEA structure to obtain EFF, CON, PTE, and RS is presented by Nasierowski (2010), and Nasierowski & Arcelus (2015). Further details on these formulations appear in Färe et al. (1994) and in Färe & Grosskopf (1998).

Universities that have rights to grant doctoral degrees in one or more disciplines, and have provide data for ranking purposes, were ranked according to their perceived quality (Ranking Uczelni... 2018). Universities are ranked according to 27 criteria, grouped into 7 categories, whereas it is accepted that the following form:

- Inputs - prestige (PRE); research potential (POT); infrastructure (WAR); internationalization (MIE);
- Outputs – assessment of graduates on the market (RYN); innovativeness (INN);, scientific efficiency (SEF).

Some limitations / constraints of the applied methodology – mainly in terms of the data set used – should be mentioned. The assessment of technical efficiency of universities is done on units with different characteristics (not reflected by any means in the data used) in terms of their scope of operations (variety of faculties). There are outlets, in fact ranked very high in terms of quality, where than potency to apply for patents (one if the metrix used to assess innovativeness) is close to zero – eg. medical schools, schools of social sciences, arts, business. In schools oriented on professional subjects – law, accounting – frequently rights to grant doctoral degrees or habilitation (metrixes from the section Scientific Potential (POT) has low priority. The used metrixes do not differentiate universities/faculties with respect to the potential to publish. Also location of the school may have an impact on its “quality” ranking where outlets located in big, vibrant, industrial centers have more “opportunities”, also in order to attract highly qualified professors, than these located in the remote areas. Despite these differences, ranking available and used here uses the same criteria, and it is questionable whether such uniformity in terms of criteria used is correct.

To be noted, the situation of any HE system should be described with statistical data related to the number of schools, number of enrolled students, sources of funding, etc. This data will allow to put the results of the study into a proper perspective: such data were not available to authors.

Results

67 examined universities are public, 18 are non-public. The average efficiency of universities in the examined set is $EFF=0,789$: 0.790 for public ones, and 0.784 for non-public.

The average $RS=0.925$: 0.932 for public, and 0.898 for non-public universities. Problems with RS may originate from the size of the university and the diversity of programs offered. Normally the bigger the unit, and the more diversity, the more problems with RS may be expected. Thus, somewhat as a surprise non-public universities have more problems than their public counterparts.

The average $CON=0.903$: 0.912 for public, and 0.876 for non-public. Congestion can be interpreted as a manifestation of inadequacy of internal systems, or a waste of available resources. However, in the case of non-public institutions it may also denote that some of the gains are transferred to profits of owners, that should not come as a surprise. On such grounds “problems” with CON may be expected for non-public units, yet need a more detailed examination and explanation in the case of public ones. Non-public schools are managed by the owner(s) whose main objectives, as may be expected, are related to their gains, even though the school cannot show profits. The attention is paid to saving operational expenses (including infrastructure). It is not the case of salaries. Professors in non-public schools may have higher salaries higher than in the public sector, which allows to attract many best professors. “Dead-soul” type employment, that facilitate contacts with state bureaucracy, is practiced. On the other token however, in the very little subsidies/support from the governmental sources all funds for research and development, or improvement of qualifications of professors/lecturers and staff must be earned by the school. This again is distorted by the need to grant support to those who can “repay debts” of gratitude. These elements may strongly affect items that impact technical efficiency, CON in particular.

Despite more problems with RS and CON on the side of non-public institutions the efficiency is almost the same. This can be explained by PTE of public universities $PTE=0.936$, versus $PTE=0.986$ for non-public ones. Out of 12 universities with PTE problems 10 are public. PTE may normally be explained by unidentified factors, or an ability to identify unexplained means that enhance EFF , yet in reality it frequently means that there is something wrong with data – someone is cheating or assessment of items used for evaluation of quality of the university are perplexing (biased assessments, incomplete data, wrong information, etc.).

23 universities operate as BPF ones: 13 public, 10 non-public that may indicate, that among non-public universities there is a higher portion of very efficient outlets than among the public ones. 12 universities operate under IRS : 10 public, and 2 non-public, that may indicate that proportionally public universities improve efficiency more frequently than non-public ones. 45 universities operate under DRS : 40 public, and 5 non-public, that indicates that improvement of performance in public institutions is less frequent than in non-public ones. 10 best ranked universities (in fact the biggest and indeed with the highest prestige in Poland) have $EFF=0.828$, experience some problems with $RS=0.912$ (the possible result of size and diversity of programs), and minor problems with $CON=0.911$.

It is crucial to note that with comparable results in terms of technical efficiency, with almost no governmental support, having much lower prestige: 0.120 for public vs. 0.013 for non-public, lower ranks in references from employers: 0.451 for public vs. 0.226 for non-public school graduates have more favorable accomplishments in the job market: 0.369 for public

vs. 0.500 for non-public. On average, correlation between prestige and references from employers is $r=0.741$, yet has no value (impact) upon success of graduates in the market. Universities' reputations have no actual bearing in the job market—skills and knowledge count, which are provided by non-public units better. Using the parametric assessment of various outlets (an item that may be regarded unbiased), the scientific potential of non-public units – 0.624; is higher than that of public units – 0.460.

CONCLUSIONS

The results obtained demonstrate that non-public universities are not more or less technically efficient than public ones. However, it is crucial to consider that non-public universities in Poland operate with almost no governmental funding. Even in such conditions, non-profit institutions benefit society and offer promising futures to their students. Notably, graduates from non-public outlets have more positive future in the job market, according to the data provided in the source used in the report.

The technical efficiency of universities could be better measured in following data were available:

- input: size of the university – value of assets (preferably accompanied by their structure), number of employees, number of full-time professors/lecturers, funding received from public sources, etc.;
- output: number of graduates per year (accompanied by their structure).

This data was difficult to find, and only some universities provided this information online. Collecting this data would require extensive research and time. This could not have been accomplished within this self-financed study. Such data are available at the Ministry of Science and Education, yet the authors could not get access to data needed.

It may be expected that private institutions are more technically efficient, when all aspects of their operations are taken into account. Casual observations indicate that:

- facilities of public institutions are not fully utilized, which is the case in private universities to the lower extend, where lecturing halls are used every-day, for example;
- the percentage of support staff at public institutions is much higher than in private ones. Again, such a pattern is observed, but numbers to prove such a statement were not made available.

Based on the results obtained from the comparison of technical efficiency of public and non-public universities, one cannot definitely claim which perform better. However, when observations presented in part two of the report are taken into account, then a different picture occurs. There are institutions that get financial, regulatory, and legal support from the government, on the other there are institutions that are independent. Leaders of public institutions are largely immune to accountability for non-performance. For non-public institutions, only the owners' creativity and entrepreneurial drive, who take chances and do not lose in such environment. If these two types of institutions compete on equal terms, Polish society may greatly benefit from improved quality of education and graduates with expertise, that will permit them to compete successfully.

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Trust in government's social media service and citizen's behavior

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Abstract

The new technologies and the expanded use of social media have already changed the communication between Government and the citizens, they contribute decisively to the transformation of public administration towards a new and open format. The citizen's trust on social media have fundamental properties, nevertheless, trust is scarcely investigated from the citizen perspective. What factors eventually influence trust and in what way this influence unfolds is largely unknown. This paper proposes new a model of transformational open government, to investigate that trust towards a government's social media is an important determinant of citizen behavior intentions toward social media. The aim of this paper is understanding the role of social media mechanisms for e-government policies, and as a useful tool to future research on social media innovation in the public sector context and social media strategy as a whole.

Keywords: Trust, social media, citizens behavior, government.

Main Conference Topic: Technology and innovation management

Introduction

Government agencies slowly but increasingly adopt social technologies to better serve their mission. These technologies can gradually reengineer the old model of public sector as they offer numerous opportunities to increase government transparency and trust, create new forms of citizens' participation and engagement in public issues, and enhance inter and intra - organizational collaboration (Park, et al. 2015).

In recent years the flood of new technologies and the expanded use of social media have already changed the communication between Government and the citizens, they contribute decisively to the transformation of public administration towards a new and open format that will be characterized by active participation of citizens in public affairs, close collaboration between public services and between government and citizens, and transparency of the State activities (Karakiza, 2015; Nasiopoulos et al. 2011; Park, et al. 2015). Social media is an effective tool to activate citizen participation in policy making processes because social media's properties that enable information sharing and non-discriminative participation facilitate communication and online relationships between government agencies and citizens (Aharony, 2012; Khan, 2012; Park, et al. 2015). The citizen's trust that social media have fundamental properties of openness, speed, and bilateralism (Shi, 2013; Bonson, 2012), which can enable a 'cyber space' that is equal for all. Thus, building trust is of critical importance.

Previous studies have found that trust antecedents and factors vary based on the type of communication community (Chenga, et al. 2017; Gefen & Pavlou, 2012). Compared with traditional computer mediated communication, social media communication focused on the social ties and relationships, thus trust building is slightly different with other contexts

(Westerman, 2014; Kimmel, & Kitchen, 2014). Consequently, current research needs to be further refined. Nevertheless, trust is scarcely investigated from the citizen perspective. What factors eventually influence trust and in what way this influence unfolds is largely unknown. In view of these gaps, this paper contributes to the literature on trust factors in the online community and aims to explore trust influencing factors in government's social media service.

This paper proposes new a model of transformational open government, to investigate that trust towards a government's social media is an important determinant of citizen behavior intentions toward social media.

Thus, this study analyzed the antecedents and formation of citizen trust and expansion in actual citizen behavior based on the structural components of trust simultaneously (institutional-based, process-based and characteristic-based).

In this scenario, we organized the paper in different parts. In the first part we make a contribution to the body of literature by examining an overview of E-Government, Gov 2.0 and Open Government. In the second part we analyze the important point of trust theory process through which trust could be shaped.

Finally we construct a theoretical model based on trust in government's social media service and the outcome of transformational e-government and we identify four scientific statements which are the results of the literature review. We close the paper by discussing future research directions for this work.

This approach introduces a new framework applicable both as a tool for enhancing the understanding the role of social media mechanisms for e-government policies, and as a useful guide to future research on social media innovation in the public sector context and social media strategy as a whole.

By identifying and discussing the main application domains, the paper will shed first light on the current and future streams of innovation in social media, thus pointing at future research directions while providing practitioners with guidelines on the innovation paths they should follow to integrate or complement their social media efforts.

2. An overview of E-Government, Gov 2.0 and Open Government

Much of the current information and communication technology (ICT) literature, relating to public sector contexts, draws frequently upon private sector frameworks (Tassabehji et al., 2016; Cordella, & Bonina, 2012). Extant studies commonly refer to re-engineering approaches (Weerakkody, et al. 2011), which argue for technology-enabled solutions to service delivery issues. Emerging models of 'electronic' government (e-government) are increasingly recognised and represented as Digital Era Governance (DEG) (Tassabehji et al., 2016).

Margetts and Dunleavy (2013) introduce the concept of digital era governance (DEG), highlighting contemporary technologies as drivers for innovative and competitive government. While acknowledging that any change is fraught with complexities, complications and difficulties, principally the potential for digital technologies is available to transform government to become more agile, less institutionally complex, more administratively simplified and automated, more responsive to citizens, and more capable of social problem-solving (Chadwick, 2006; Rhodes, 2011). The paradigms of public sector management – both traditional and new public management – do not comfortably fit with the emerging DEG, or networked governance. There is, therefore, a need for a 'new' paradigm: one that incorporates the nature of emerging systems in the management of public services and programmes, addresses a different way of working for public sector participants, and one that can "steer society in new ways through the development of complex networks and the rise of more bottom-up approaches to decision making" (Stoker, 2006, p. 41).

Nevertheless, there is significant scepticism about whether DEG is able to evolve through other important phases towards genuine government transformation. Norris (2010) for example, predicts that in 2020 digital government will not be significantly different from today's e-government, with a similar range of transactions and degree of interactivity that is currently available, and only limited transformation.

Moreover, Norris (2010) suggests that technology applications will be largely predetermined, institutionalised and routinized so that it is no longer prefixed with 'electronic' but principally just government. Studies of technological innovation and diffusion (Zhu, 2006), further suggest that the needs and characteristics of the organization dramatically affect the ways in which technologies are implemented and the extent of their impact.

IT-enabled changes to public sector organisations are not self evident, but are inevitably refracted through the formality of existing institutional practices.

E-government still remains defined in quite narrow terms — mainly through managerial control and cost reduction (Chadwick, 2006). Researchers have noted that no significant progress has been recently made in the field of e-government, and many programmes have proven to be disappointing (Hardy & Williams, S. P. 2011). Luna-Reyes and Gil- Garcia (2011) suggest that where e-government projects fail to deliver on their promises, this largely results from a lack of understanding about the relationships between institutional arrangements, organisational factors, technologies and socio-economic contexts.

Gov 2.0 is not just an adoption of Web 2.0 tools. Actually, the adoption of technology to the existing process is mostly a characteristic of Web 1.0 or e-government. Gov 2.0 is about integrating new technologies together with a change in organizational culture, to increase openness, participation, transparency and collaboration in the public sector. Gov 2.0 provides a high interaction between government and citizens, who are co-creators of government information (Karakiza, 2015; Hardy & Williams, 2011). Moreover, Mergel, (2013) defines Government 2.0 as "the use of IT to socialize and commoditize government services, processes and data". Apart from the prevalence of ICT, this definition puts emphasis in the terms of socialization and commoditization. As a result, the boundaries between government and citizens blur. Although the terms Gov 2.0 and Open Government are sometimes used interchangeably, Open Government stresses on data openness and citizen engagement (Gartner, 2009). The drivers of the open and collaborative government approach can be grouped into three main categories: citizens-driven issues, technology-driven issues and economic-cost driven issues.

According to the vision, the public sector transformation is triggered by the advent of social media, ubiquitous mobile connectivity and web 2.0 activities that allow the mass dissemination, production and collaboration. The engagement with the wider public promotes greater trust in public administrations and thus enhances public services effectiveness and public value. Studies that have demonstrated the role of social media for the purpose of securing government trust confirmed that citizen trust toward the government can increase if the government understands the characteristics of social media and utilizes them appropriately (Kim, et al. 2013). Citizen trust toward government agencies can be simultaneously a factor facilitating citizen participation in the social media provided by the government agency and an outcome resulting from the social media (Hong, 2013).

3.Trust in the government and structural components

Many scholars have referred to the importance of information technologies and improved channels of communication, which would reduce information gaps and improve citizen trust in the government as it increases communication between the government and its

citizens (Chadwick & May, 2003; Rho & Kim, 2007). Trust is also created through an interrelationship between citizens and the government, and it can be built through citizen credibility in the information they exchange in communications (Corritore et al., 2003). The full information should be provided so that citizens can build credibility from the information that they know. A government provides information to its citizens in order to establish government-to-citizen trust and the public information is expected to have several characteristics of full information such as completeness, timeliness, and trustworthiness (Gelders, 2005). The government's provision of information is also related to citizen access to the required information, i.e. the timing of the provision and the access to the information, as well as the guarantee of the characteristics of the information. The government should ensure that the information has characteristics similar to the assurances of physical, intellectual, and social normative access whenever citizens use public information (Burnett et al., 2008; Jaeger and Bertot, 2010).

An important point in conceptualizing trust understands the multidimensionality of both the content and the trusted target (Shapiro et al., 1992; Thomas, 1998). The content defines trust as a cognitive, emotional, and behavioral concept. The cognitive dimension is the process of choice in determining the object of trust on the basis of the information and knowledge known about the object, and the emotional dimension is the feeling of liking or disliking the object of trust and it consists of sentimental and emotional senses of bonding. Finally, the behavior aspect is defined as the strong willingness for dependency between the trustee and the trustor. The multidimensionality of the trusted target implies that the object of trust could be human beings, organizations, or even institutions, society, and systems. The multidimensionality of the trusted target is related to relationship between the trust toward human being and institutions and the level of analysis in experimental studies.

The important point in trust theory is the process through which trust could be shaped (Thomas, 1998). Based on this mechanism, Zucker (1986) classified these processes into: process-based trust, characteristic-based trust, and institutional based trust according to the production patterns or foundation for trust.

Process-based trust is shaped through the experience of continuous exchanging relationships or repeated compliance with expectations and the core is mutual reciprocity. In this context, trust is formed not by temporary events but by continuous and close relationships among the parties involved. The important point is the predictability in the action of the trustee and the following reputation, which is attained through repeated and multi-dimensional relationships. From the perspective of trust in the government, reciprocity is the significant factor in constructing trust between the government and its citizens, which stems from the recognition that the government is responsive and accessible (Tolbert and Mossberger, 2006), and government services using social media positively affects the increase of reciprocity (Khodyakov, 2007). Characteristic-based trust consists of characteristic similarity between the trustor and the trustee. Such similarity originates from the ascribed characteristics of a group to which an individual belongs.

In online contexts, it has been demonstrated that an avatar's internal similarity to the user positively affects the interaction intentions (Pentina and Taylor, 2010). It is possible that social media users also consider perceived similarity when making the decision to trust, join, and continue to use social media sites. Understanding user perceptions of social media brand identities and their assessments of how strongly these sites match and reflect their own identities may be important for creating new and unique social media brands that can be trusted, and for uniquely utilizing social media sites for public relations (PR) with citizens (Pentina et al., 2013). Thus, the perceived characteristic similarity among parties involved in communication and interaction is beneficial for increasing trust.

Finally, Institution-based trust is based on guarantees and recommendations from third parties (Shapiro et al., 1992). Lane and Bachmann (1996) argue that trust-based relations rarely evolve spontaneously at the individual level, but are highly dependent on the existence of stable institutions. Zucker (1986) suggests that institutional trust is the most important mode of trust creation in diverse transaction and business environments where there is no previous interaction and where the participants may come from different social and cultural backgrounds. Institution-based trust exists when trust is tied to the existence of structures assurance, which is independent of dyadic actions (Pavlou and Gefen, 2004). From the perspective of trust in governments, structures assurance results from citizens' positive attitudes that the government is transparent, responsible, efficient, and effective (Tolbert and Mossberger, 2006).

4. Government and social media strategy: The theoretical model

Many government agencies are attempting to use social media tools to communicate with the public. However, in spite of diversity benefits, a lack of understanding and readiness in government to completely introduce and embrace social media harms them (e.g. cyber-cascade, cyber-balkanization, etc), and thus the government overall, rather than restoring citizen's trust toward government. accordingly, governments should not only consider the benefits of social media as tools to promote citizen's trust toward government but also understand the mechanism and antecedents of trust in government's social media.

The use of social media by a government can be justified by their collaborative and participative nature (Bertot et al., 2010), and this use may have various forms (Khan et al., 2012; Kim et al., 2013; Ngai et al., 2015; Ghezzi et al., 2016; Di Virgilio, 2018a). Previous studies have suggested that due to their collaborative and participatory nature, social media can be instrumental in promoting open governance through providing citizens with a voice (Bertot et al., 2010). The public sector has increasingly used social media for various purposes such as facilitating relationships and interactions, exploiting various social media tools for government information and services, and providing new channels for political participation and deliberation (Kim and Park, 2012; Steenkamp and Hydeclarke, 2014).

According to Mergel (2010), governments generally have a threefold social media strategy: push, pull, and networking.

The first two strategies consider social media to be one of many media channels and thus incorporate them into the existing channels. The push strategy employs social media as representatives, and the pull strategy uses them as advertising tools for directing audiences to other online media such as websites or blogs. The push and pull strategies have important advantages in the information sharing domains of public administration and services that require immediate delivery of information, such as public safety and crisis management (Jaeger and Bertot, 2010). In contrast, the networking strategy exhibits a distinct pattern of social media use: it uses social media as a tool for directly connecting with audiences and therefore enables active involvement of the audience in the communication or information sharing process, such as crowd-sourcing policies (Bonson et al., 2012; Cho and Park, 2012; Golbeck et al., 2010). Regarding the networking strategy, previous studies have noted that

social media use in municipal governments can be effective in communicating with citizens and in inducing their involvement in government policies and actions.

Citizens perceive the government as responsive and accessible through improved communication and interactions with them. Social media creates new opportunities for interaction with officials that are convenient and quick, which potentially enhance the government's responsiveness.

Government service provision through online media including e-government contributes to the formation of such positive reputation (Kim et al., 2013). Citizens can perceive governments as transparent through the posting of information such as news, data, policies, and visions of government; furthermore, searchable databases in a government's social media may also make information searches easier for citizens.

Furthermore, as citizens may perceive a government's social media as efficient and effective through the use of the latest technology to automate processes, improve service delivery, produce budget savings, and save time. Online transactions and downloadable forms are examples of more efficient and effective processes that can be facilitated through a government's social media.

Considering the research literature and the above description of trust in the government and the important role of social media service we have constructed a theoretical model of transformational e-government. The government's policies that there is a direct effect of the trust and social media services. Beside the specific application of the relation to the specific trust, we add some value to the model considering the mediation effect which is played on citizen behavior by trust in the specific platform and the availability of social media services.

Figure 1 describes our theoretical model to enlighten the mediation effect of the variables on transformational e-government.

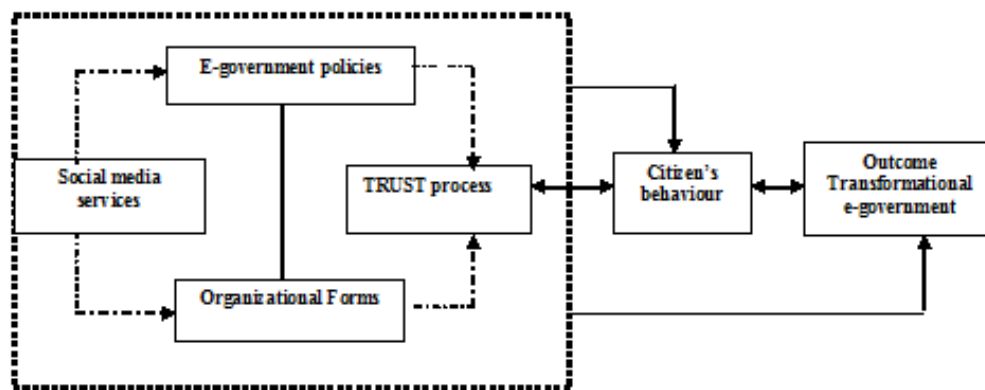


Figure 1: The theoretical model of transformational e-government

The latter propositions come from the following statements which are the results of the literature on the trust in government's social media:

Structural assurance toward government's social media positively affects confidence in the agency providing the social media (or overall trust in the government).

Reciprocity of liking a government's social media positively affects confidence in the agency providing the social media (or overall trust in the government).

Perceived characteristic similarity toward government's social media positively affects citizen confidence in the agency providing the social media (the overall trust in the government).

Penetration of new technologies in public administration are actively moving towards a model of transformational e-government.

6. Conclusion

This study is meaningful as research that discovers the antecedents of trust in government social media use employing Zucker's integrated perspective for the structural components of trust. This study proposed a new model of the antecedents and formation of citizen trust building and expansion in the actual citizen patronage behavior based on Zucker's trust theory. This model explain that factors related institutional-based trust, characteristic-based trust, and process based trust contribute to improving trust through government social media services. Therefore, governments should try to fully understand components and related factors of not only institution-based trust, but also characteristic-based trust and process-based trust through appropriately considering the characteristics of social media.

In addition, this research also point out that the formation of citizen trust in the government could be expanded into patronage intention toward social media and actual behavior. Because the participation in social media increases through geometric progression, it is expected that not only simple use by citizens but also patronage behavior further accelerate the participation of others. That is, it was found that trust toward the government is simultaneously a factor facilitating citizen participation in social media provided by the government and an outcome resulting from social media. Thus, each government should create a policy direction of ensuring trust, promoting participation, and linking it to trust improvement.

Finally, this study emphasizes the importance of appropriate understanding of the media characteristics of social media in order to increase citizen's trust with government social media services.

The relationship between the factor for trust insurance and social media use, and the evaluation of citizen behavior effects addressed in this paper, requires strict analyses considering personal characteristics such as different populations.

For example, the expansion effect of citizen trust extracted from Facebook could differ in other SNS channels such as Twitter according to the properties of the media and communication systems. Accordingly, studies that compare SNSs such as Twitter, Facebook, and non-SNSs such as websites are required in order to confirm a generalized logic for government trust in social media.

In this regards, two missing links emerge.

The first, the social media phenomenon arose as an applied paradigm for communication and networking among citizens, with a limited or fuzzy theorization backing it (Ngai et al., 2015; Ghezzi et al., 2016).

The second, relatively little attention has been paid to new platforms, new scenes, and new applications of social media, practical application problems have been derived that are related to security control mechanism and individual privacy protection (Zhang, 2015; Di Virgilio, 2018b).

Social media adoption constraints emerge as difficult to counteract limits, whether we speak about hesitation (users do not know how to use social media and find difficulties in adopting the technology), incertitude (the user has opinions regarding the low potential of the communication means) or conditions of reduced adaptability of the organizational environment and the list could go on depending on the social-economic and cultural background in which the organization operates (Ciochina, 2013).

Risks may appear following the use of social media (Zhang, 2015; Zhang, & Gupta, 2016), they are related to information security, to how citizens are supervised, the way resources are granted, time management, how organizational culture and online identity manifest themselves and to the implementation and management of the new technologies (the lack of knowledge and understanding of social media).

7. Future research directions

From a research perspective, this paper sets a broad agenda for future research. Given the nascent nature of the study phenomenon, there are many exciting opportunities for new research. This study has also aimed to contribute to the public sector context and organizational disciplines in two principal and differentiated but related ways.

Furthermore, government agencies have to clearly identify what information and knowledge is to be kept confidential and what is to be shared and made available to others. Such practices as open innovation practices have demonstrated the value of sharing information that has previously been considered to be confidential. In this study, social media emerges a new perspective (Di Virgilio, 2018a). Enormous information can be shared using powerful tools to a world in which the social factors play an essential role. In our new accelerated world, numerous technologies have been developed to support social capital connections (social networking services like Facebook, LinkedIn) and to communicate in a more effective way (instant messaging services like Skype, Viber).

For government agencies that ensure value of organizational communication, integrating social media tools into their daily business life is essential to enable for the citizens an easy access; and offer trainings to inexperienced users. The social media can be analyzed by studying the behavior of its' users, which might be an individual or organization. The Internet users need to be well-informed about the threats that are faced by their personal and financial information. They should be able to behave securely and use reliable security measures at their aid. The direction is significantly theoretical meaningful for realizing secure interaction, sharing and digital rights management of social media content, continuously improving platform security. It has also better applicable vision and practical application value for healthy, normal and rapid development of digital media content industry.

Practitioners can use this study to evaluate the role of social media strategy within organizational communication and better target future interventions towards open government most likely to benefit. From a better understanding of the determinants, a government will have greater understanding of the true needs and expectations of their citizens.

Anyway, considering that social media is global, cross-cultural research on the transformational e-government effect would be an interesting issue.

Several managerial implications can also be utilized. It is recommended for management to support introducing social media technologies, establish the terms and conditions of usage, communicate the benefits and provide the necessary trainings.

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Gender Specific Analysis of Education and Wage Income Relation through Income Quantiles in Turkey

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Abstract

This study examines the relationship between wage income and education in the light of the income inequality against women. The data used in the study is obtained through household budget survey by the Turkish Statistical Institute between 2002 and 2013. To determine the relationship between income and education and the pattern of the income distribution, ten income quantiles which represent mean wage income and duration of education (years) by gender are evaluated. Panel data regression is applied by using the percentage change in wage income and duration of education (years) to investigate how gender wage gap is affected by education. According to result, the relationship between education and wage for women is weaker than that of men. Also, mean values are assessed for each income quantiles to highlight the pattern of the relationship in terms of women's situation in labor market.

Key words: Gender pay gap, education, income inequality, income distribution

Conference Topic: Macroeconomics

Introduction

Despite pro-women policies, the wage gap between men and women has maintained its topicality. The gap is usually explained by observing characteristic which affect productivity such as education, labor market experience and occupation. The unobservable factors which are responsible more than half of the gap are attributed to discrimination (Chevalier, 2007). However, education is an effective way to strengthen the position in labor market for not only women but also the other disadvantage groups. Because of this reason, although there are studies examining the effects of family formation and patterns of labor market participation to determine the wage differences in wage income, most of them have been focused on the relationship between education and gender wage gap (Bobbitt-Zeher, 2007). Women think that education is their only chance to get well paid job in the market. Also, it should be noted that equal education opportunity doesn't feed equal treatment in the environment of education or in other words, that doesn't bring equal opportunities in the results (Webb, 2001). Females have greater success in during their high school and attaining postsecondary education to overcome their disadvantage in job market. Current female education trend in Turkey is moving in the same direction (e.g., National Center for Education Statistics, NCES 2004).

There is significant improvement in girls' school enrolment in Turkey. In general high school education, the rate of enrolment of girls which was slightly over 50 per cent in 2007 then increased significantly and reached over 80 per cent in 2016. While the rate of schooling in girls is higher than boys in general high schools, it is the reverse in vocational high schools (Karadeniz, Yilmaz: 2018).

Improvement in female education indicators which resulted in improvement of women income have positive impact on household and national economy. In the case of household resources under control of women, its contribution to human capital and skills would be greater. Because of this reason, development of the equity notion in education and labor market is vital for inclusive growth (Kabeer, 2012). The other factors affecting women labor participation and wage income level are related responsibilities which are shouldered by women as a part of their social roles, for example marital status, number of children, children's ages (Humphries & Sarasúa, 2012). Also, work-related factors shouldn't be ignored to explain income inequality among young female and male young earners (Bobbitt-Zeher, 2007:1).

Research Methodology

The income of the individuals was calculated from the raw data obtained by Turkish Statistical Institute through Household Budget Survey, and then these revenues were categorized as income quantiles, using the method of Yilmaz 2016. Incomes ranked from lowest to highest taking into account of weighting and divided into 10 equal parts are used to calculate mean wage of women and men for each quantile. Also, female and male populations in each quantile are evaluated in terms of education level and duration of education as years. Analysis of data by quantiles gives opportunity to evaluate the impact of education on earnings for population placing in the different income level.

Table 1 Definition of Variable

Variable	Definition
Wage Differentiation Ratio	Female earnings as a percentage of male earnings according to mean value in each quantiles.
Education Differentiation Ratio	Female education years as a percentage of male education years according to mean value in each quantiles.
Dependent Child	0-14 child population in the household which women are wage earner/wage earner women
Dependent Elder	65+ population in the household which women are wage earner/wage earner women

Findings and Discussion

The equation in the study were estimated with ordinary least square and fixed effect model. The heteroscedasticity problem in our estimation in model 1 was corrected by using fixed effect model. The other reason why this model was used instead of random effect model is due to structure of the data. "The choice between fixed or random effect models can be made

depending on the aim to predict the estimator. The fixed effect model would be more appropriate if an inference is made for the particular units.” (Williams 2015). In the study, we are interested in analyzing the impact of the quantiles on wages and education. Therefore, we assume that time-invariant characteristics of each quantiles are unique and they are not correlated to each other. Although it is known that the effect of unobservable variables is omitted, this model was used to explore net effect of education on women wages. The equations estimated with two model can be followed below:

$$\text{WageDiffRatio}_{it} = \alpha + \beta_1 \text{EducationYearRatio}_{it} + \varepsilon \quad (1)$$

$$\text{WageDiffRatio}_{it} = \alpha + \beta_2 \text{EducationYearRatio}_{it} + \beta_3 \text{DependentChild}_{it} + \varepsilon \quad (2)$$

$$\text{WageDiffRatio}_{it} = \alpha + \beta_4 \text{EducationYearRatio}_{it} + \beta_5 \text{DependentChild}_{it} + \beta_6 \text{DependentElder}_{it} + \varepsilon \quad (3)$$

Table 1 Ordinary least squares and fixed effect regressions of wage income differentiation ratio

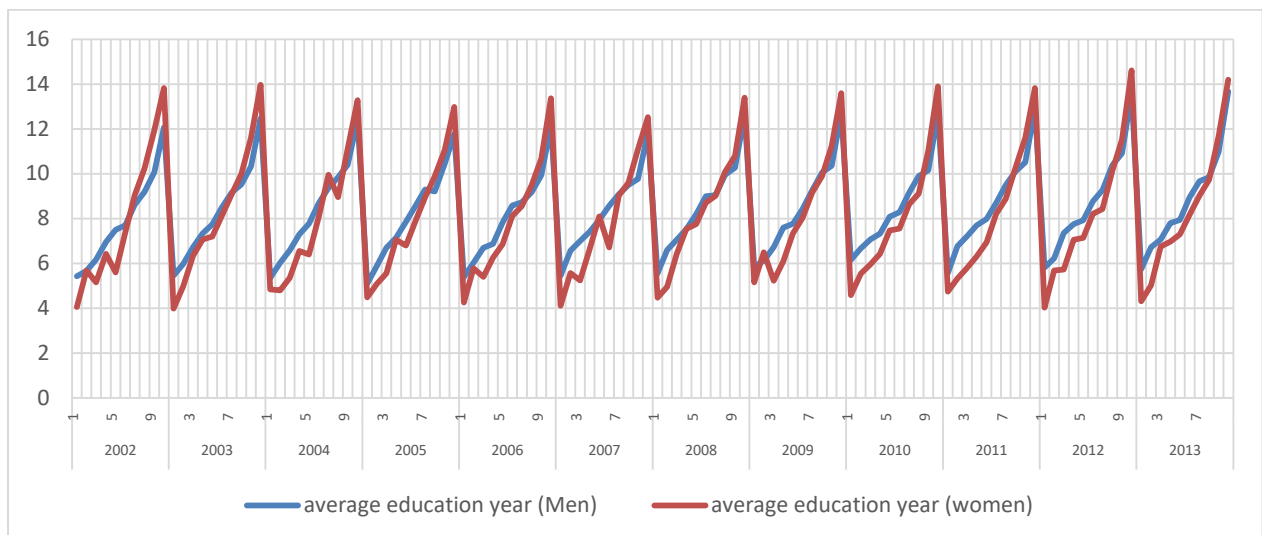
		Model I			Model II	
		Ordinary Least Squares Regression Dep. var. = wage differentiation ratio			Fixed Effect Regression Dep. var. = wage differentiation ratio	
		Unstdized. coeff. (β)	Std. error of β (t statistics)	Stdized. coeff	coeff. (β)	Std. error of β
Equation 1	Constant	46.423***	8.875(5.23)		24.266***	16.197(1.50)
	Education Year Ratio	0.204**	0.095(2.14)	0.194	0.443**	0.175(2.54)
	Number of obs (N)	120			120	
	F statistic (df)	0.034				
	Adjusted R ²	0.029				
	R ²	0.038				
Equation 2	Constant	26.662	18.163(1.47)		36.376*	19.157(1.90)
	Education Year Ratio	0.327**	0.137(2.38)	0.3114	0.410**	0.176(2.33)
	Dependent Child	9.599	7.704 (1.25)	0.163	-10.528	8.934(-1.18)
	Number of obs (N)	120			120	
	F statistic (df)	0.0495				
	Adjusted R ²	0.0339				
	R ²	0.0501				
Equation 3	Constant	23.239	18.530 (1.25)		36.883*	19.804(1.86)
	Education Year Ratio	0.326**	0.137 (2.38)	0.310	0.409**	0.178(2.30)
	Dependent Child	9.344	7.712 (1.21)	.158	-10.448	9.005(-1.16)
	Dependent Elder	31.437	33.331 (0.94)	.085	-3.596	33.069(-0.11)
	Number of obs (N)	120			120	
	F statistic (df)	0.0759				
	Adjusted R ²	0.0329				
	R ²	0.0573				

Notes: ***, **, * indicate statistical significance levels of 1%, 5% and 10% respectively. N is the number of observation. P-value and F-Test (P Value) indicate significance level of model and parameters and t statistics are given in parenthesis.

In the study, male-female wage and education differentials are tested in terms of their relation. When we look at the model ignoring unit effect, explanatory power of regression

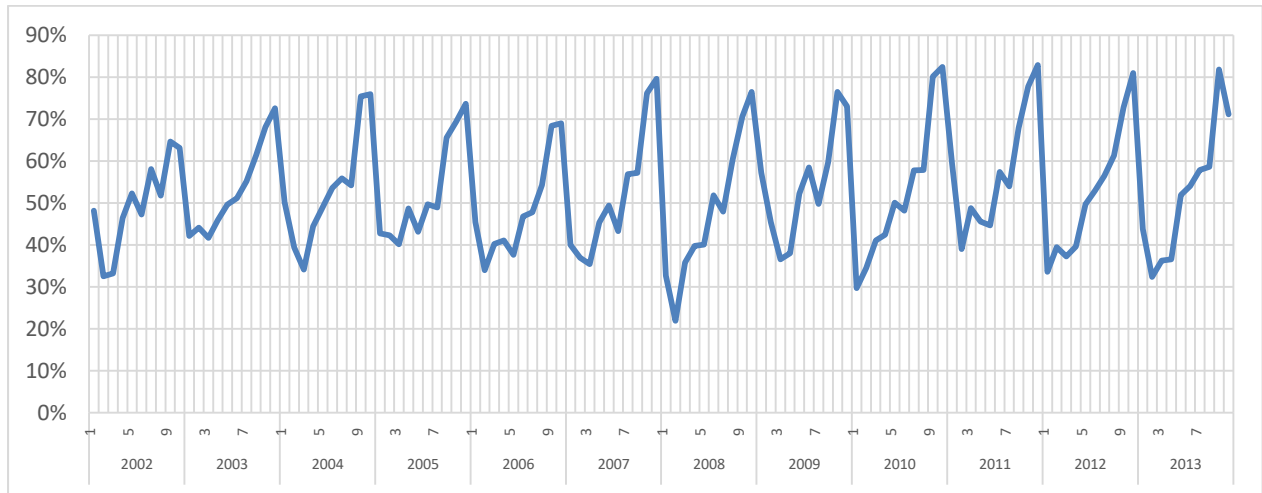
model is just about 3 %. The effect of independent variable on the dependent variable is about 0.2 percent. Also, the other factors like caring responsibilities of women were evaluated in second and third equations. These factors were found insignificant. We found 1 % differentiation in the education accounts for about .44 % of the female wage differential in comparison with that of man. When we compare the coefficients in two models, the coefficient in model 2 matching our data structure better is higher than that of one in the former model. In the light of these findings, unobservable factors dominating wage differentials between men and women can be inferred from regression analysis through years and quantiles. Also, the degree of independent variable to explain the variance of wage differentiation ratio proves that women should receive more education than men to strengthen their position in the labor market.

As you can see in the following chart, in the upper income quantiles, the female average education year is getting closer to male for every years. This means that women's in upper-income groups have higher access to education. Education support targeting young women particularly living in the relatively poor households becomes more important, which increase the education level. Supporting young women in the field of education and development of public programs that incorporate positive discrimination will positively affect achievement in education (Karadeniz, Yilmaz: 2012).



Graph 1: Average Education Year

While the wage differential between women and men continues in the upper income groups, especially in the last two quantiles, this difference tends to decrease with the effect of education and other factors. During the period between 2002 and 2013, women in 10th quantile earn between 83 and 63 percent men's wage income. However, for the same quantile, education attainment year of women varies between 104 and 115 percent of men's education duration.



Graph 2: Wage Differentiation Ratio (Women/Men)

Conclusions

In the upper income groups, education year of the women has been increasing significantly in Turkey. When we look at the differences in returns to education across the quantiles and years, it is clear that the wage gap has improved by years in the higher income quantiles. In high income quantiles, women are more educated than men but men still earn more. At this point, it can be inferred that education is not only enough to decrease the wage differences of women and man. However, remarkable success in increasing women's employment and strengthening their position in labor market is possible by overcoming discrimination against women.

At the same time, effective incentives to women such as childcare benefit, tax credit which increase the disposable income support women's employment.

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As an experienced senior statistician and statistical analyst, he has worked in different coordination and consultancy positions for private sector, academic institutions, NGOs, international organizations such as World Bank, UNDP and UNFPA, as well as public institutions for more than 15 years.

Three pillars of macro-economic perspective to enable transparent FDI processes for foreign direct investments

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Abstract

It is obvious, that the internationalization proceeds in a vast way and almost all industries and branches are affected. This change is more a paradigm change than just evolutionary development. Basic economic constructs have been transformed completely. Internationalization forces companies and its employees with a huge variety of different influence factors, which became more and more complex by this dramatic change over the last decades. Foreign direct investments done by companies are instruments to go and become international. Those instruments are influenced not only by micro-economic factors, but also from the macro-economic level. The current theory mainly deals with the micro-level perspective. This paper focuses on different varieties of macro-economic factors and its influence on FDI decisions. The study was carried out for the special circumstances of the automotive industry sector. An in-depth literature study allowed to extract a differentiation of macro-economic pillars which may influence FDI decisions. The methods used are structured interviews, electronic surveys, construct and evaluate a cause effect model. As a comprised result, three main categories of macro-economic factors affecting FDI decisions significantly: Expected market volume, Production Factors and Public and Governmental Conditions.

Keywords: Internationalization, Macro-Economic Factors, Incentive Schemes, FDI

Main Conference Topic: Management Sciences and Economic Development

Introduction

The growth of enterprises and expansions to new markets has dramatically accelerated over the last decades (Westerfield et al., 2004). This business model became more important and internationalization and globalization are terms which are used commonly in many economic contexts (Adler, 2008). Motivations therefore can be to seek natural resources, new markets, efficiency or to seek strategic assets (UN, 2007). *“It is an assumption of business in the twenty-first century that competition is becoming more international scope. Even industries that appear likely to be national or regional in focus [...] have, over the last several years, become more international in character.”* (Barney, 2002). Larger markets bring more business opportunities for companies. Enlarging smaller existing markets often is a good opportunity, proactive motive (Sternad et al., 2013), or even is the only change to survive on the market, to gain a higher value to the company. If a company is going to establish a subsidiary abroad, a dominant motive therefore is the exploitation of a new market with further potentials for existing products.

When existing customers go abroad and want to take their suppliers with them or when the company is driven by the competitors *“if they go, I have to go too!”* (Gutmann et al., 2000). If the domestic market is saturated by their own company or by competitors, it is often the only opportunity to start transnational activities (Sternad et al., 2013). This can be done only by selling to new markets via sales partners or sales representatives or also to start a production in a foreign country because of lower labour costs or production costs in

general. Further reasons can be that certain important resources are located outside the domestic market. Barney (2002) defined the five most potential sources of economies of scope for firms pursuing international strategies. As these are: To gain access to new customers for current products and/or services; To gain access to low-cost factors of production; To develop new core competencies; To leverage current core competencies in new ways; To manage corporate risk.

Foreign Direct Investments (FDI) are commonly used instruments for such expansive strategies. These decisions are affected by a various number of impact factors. Internal as well as external driven. The external and macro-economic will be put into the focus of this paper as this environmental level is given and not directly influenceable by the companies themselves. So, they have to adapt them to this framework.

Theoretical Foundations and related Works

Sternad (2013) separates the export and internationalization motives into two practices which is a summary from other researchers (Albaum, Dürr, 2008; Hollensen, 2011):

Proactive Export- and Internationalization-Motives: The aim to grow and increase profit abroad; The general willingness of the management, to internationalize the existing company; Recognition of chances in foreign markets of firm-specific products, technologies or marketing concepts; Higher utilization of existing production capacity; Gaining economies of scale by using marketing and sales activities also in other countries; A diversification of risks by the sale of own goods or services to countries with different political and cyclical economic trends.

Reactive Export- and Internationalization-Motives: Unasked requests and orders from international customers; The wish of national customers to follow as an existing supplier into foreign markets; The pressure of competition which occurs when international acting competitors have already makes use of the economies of scale and use this advantage also in the home markets; When the home market is too small and saturated; The usage of currency fluctuations, which enable the home market prices to attractive offers to the customers in other countries; Initiatives for exports by incentive schemes by governments, economic chamber of trade, commerce and industry or bank institutes.

The **most important internationalization motives** according a survey of Holmlund (2007) are shown in Table 1. 178 small- and medium sized Finnish companies has been asked about their motives to go international.

Table 1: Motives for Internationalization

No.	Motive	Influence *
1	Interest of Management	3,74
2	Small Homemarket	3,56
3	Customer Request from Abroad	3,02
4	Free Production Capacity	2,90
5	Possibility to increase Profit	2,78
6	Follow an Existing National Customer Abroad	2,65
7	Unique Products	2,61
8	Follow the Competition Abroad	2,21
9	Requests from a Business Partner	1,82
10	Technical Advantages	1,67
11	Achieve of Size-Advantages	1,56
12	Support of a regional Organization or a similar Facility	1,53
13	Cooperation with Competitors or Business Partner	1,52
14	Cooperation with Suppliers	1,33
15	Distance to Customers or/and Harbours	1,31
16	Tax Reasons	1,03

* 0 = no influence; 5 = strong influence

(Source: Author's own construction based on Holmlund et al., 2007)

The survey from Holmlund et al. (2007) shows a strong influence of the strategic willingness of the management itself to go abroad or not. Also the existing market is for those companies an important factor. Growth hereby is a factor. But also request from abroad is often a driver to take the decision to start such a venture. And of course free production capacity and increasing profit is an economic factor which has to be considered. Interesting is the low influence of tax reasons or the closeness to customers and/or harbors (Holmlund et al., 2007). And which motives for internationalization are in the foreground is influenced by, and dependent to, a broad number of different factors. Sternad et al. (2013). The size of a company and international experience of the company and its staff has big impact to internationalization decisions. As well as home-market conditions. Is the market shrinking or is the competitive situation unsatisfying? Specific issues with a certain branch? (Sternad et al., 2013). And most of the cases, Sternad et al. (2013) say, it is a bundle of motives which leads to a decision to go abroad.

To take the decision and doing investments is always affected by different factors. Investments of companies who may spend big amounts of money into foreign countries are even more complex and often are combined with risks and the potential to lose money. According to Pustay and Griffin (2007) three major factors affecting FDI decisions. And these can be classified into *Supply*-, *Demand*- and *Government Factors* as illustrated in table 2.

Table 2: Factor which Influencing FDI Decisions

Factors Affecting FDI Decisions		
Supply Factors	Demand Factors	Government Factors
Production Costs	Customer Access	Economic Priorities
Logistics	Follow Clients	Avoidance of Trade Barriers
Resource Availability	Follow Rivals	Economic Development Incentives
Access to Technology	Exploitation of Competitive Advantage	

(Source: Author's own construction based on Griffin, Pustay, 2007)

Those main factors which affect the FDI decisions according to Griffin and Pustay (2007) in the strongest way, will be enlarged to factors from other researchers, such as Dunning (1978, 1980, 1983) or from Earnest and Young (2016), which regularly publish new empirical

gained data about drivers for FDI decisions with special focus to certain branches and markets and also for the specific characteristics of the automotive branch.

Demand Factors (Aswathappa, 2008): The market expansion is a strong motive for FDI decisions. This includes Customer Access, Following Clients, Following Rivals, Exploitation of Competitive Advantage and Customer Mobility (Griffin and Pustay, 2007).

Gaining **access to customers** often requires physical presence in their markets to be able to serve them in a proper way. Some countries bring a high level of quality reputation for certain products with them. German automotive engineering is a good example as a high quality reputation. The perception of buyers can enable firms to produce the goods in the country with the highest quality reputation and therefore be able to get premium prices. Although the company may be based in a different country. Companies with a high reputation and a valuable trademark or brand name or even technology may choose to operate in foreign countries (with subsidiaries) rather than export to them to gain **competitive advantage**. Also clients of companies often attract FDI. **Following clients**, who build facilities in foreign countries to enter new markets, enable the possibility to also expand business with existing customers by locating a new factory of its own nearby. It enables to continue to supply its customer promptly and attentively. This practice is often used in industries in which main goods are obtained from suppliers with whom the company has a close working relationship. Following clients also means a competitive advantage can bring win-win situations for both parties. The supplier minimizes the risk of gaining business after spending FDI and the customer doesn't need to establish a new and unknown supplier. A further possibility of gaining competitive advantage by spending FDI is to **follow rivals**. A competitor analysis enables to find out their geographic strengths and weaknesses of individual competitors and the followers can select markets for FDI for their ventures. Most of the MNCs regularly monitor market sizes and growth rates – also on a global perspective (Griffin and Pustay, 2007).

Supply Factors according to Griffin and Pustay (2007) include: production costs, logistics, resource availability and access to technology.

Production costs can influence the competitive situation in both ways, negative and positive. MNCs often try to locate their production facilities in low wage countries to gain competitive advantage out of it. Not only labour costs are of importance for FDI, but also real estate prices and lower taxes. In terms of **logistics**, MNCs seek to invest into subsidiaries in foreign markets if the cost of transport raw materials is high. Also infrastructure is a driver for FDI. **Natural resources** are often of essential importance for companies and their products. MNCs tend to utilize FDI to access natural resources. Natural resources attract many MNCs. Examples for important resources are iron ore and wood. Key Technology is also a main supply factor and affects FDI decisions. **Technology** influences every aspect of the global market place, it drives innovation, affects partnership and locations and changes stakeholder relationships (Aswathappa, 2008).

Public and Governmental Factors according to Griffin and Pustay (2007): Political activities are often influence factors to attract or repel FDIs. Economic priorities and strategic political directions of the host country, avoidance of trade barriers and development incentives are the main political impact factors for FDI (Aswathappa, 2008).

Economic priorities of emerging markets and development countries regularly have misalignments with profit-oriented strategies and goals of MNCs. The host countries want MNCs to invest into infrastructure and developing areas, but the international investors seek to invest more into consumer goods industries. Therefore, development countries impose restrictions on the flow of FDI into their economies. This is not in general, there

are examples, see on the example of China or India (UNCTAD, 2015), which allowed and welcomed FDI to enable big economic growth. A driver to affect FDI flows is the **avoidance of trade barriers** (Aswathappa, 2008). Such barriers reduce the flexibility and the willingness of FDI from MNCs which follow the profit-oriented strategies. Development incentives are interesting for MNCs and related FDI decisions. Governments offer **attractive development incentives** to MNCs to invest in their economies. In particular developing countries. The primary motive of developing countries to attract FDI is to fill the resource gaps from the industrialized countries (Griffin, Pustay, 2007; Aswathappa, 2008).

Used Methodology and Model Development of Macro-Economic Impact Factors

To determine the independent macro-economic variables, the study of current research results brought three main groups of variables which may influence upcoming FDI decisions managers have to take. Following variables have been extracted and operationalized for the postulated causal model:

DEMAND: This independent variable in the postulated causal model summarizes the influence factors of the **“expected market volume”**. Griffin & Pustay (2007) have defined following indicators for the demand level: Access to customers, follow existing clients, follow current rivals and exploitation of competitive advantage. This factor has been expanded with further influence factors linked to expected market volume: Gaining new market shares and launch existing products in new markets (Sternad et al., 2013).

Table 3: Operationalized latent exogenous variable “Demand”

DEMAND	
Independent exogenous latent Variable	Expected Market Volume - Indicators for Operationalization
	<ul style="list-style-type: none"> - Customer Access - Follow existing Clients - Exploitation of Competitive Advantage - Gaining new Market Shares - Launching existing Products in new Markets

(Source: Author’s own construction in acc. to Griffin&Pustay, 2007; Aswathappa, 2008).

The demand factor is determined and operationalized by the indicators shown in figure 15. After the survey and its analysis, each indicator is going to be analyzed if it fits to the model’s criteria. If not, the indicator will be excluded from the model. This method will be applied for all indicators in the whole causal model.

SUPPLY: The supply factors represents the factor of **“production costs”**. It summarizes the effect of direct costs for production, availability of resources, logistics advantages, available technological advantages (Griffin, Pustay, 2007). Extended with labour costs and industry infrastructure (Sternad et al., 2013).

Table 4: Operationalized latent exogenous variable “Supply”

SUPPLY	
Independent exogenous latent Variable	Production Factors - Indicators for Operationalization
	<ul style="list-style-type: none"> - Low Labour Cost - Existing Industry, Follow Them - Logistic Advantage (Harbour, Distance) - Access to Resources - Access to Technology

(Source: Author’s own construction in acc. to Griffin&Pustay, 2007; Aswathappa, 2008).

This factor supply as shown in figure 16 measures if the costs and supply goods are of high importance to the company's investment behavior.

PUBLIC AND GOVERNMENTAL CONDITIONS: The third independent variable in the postulated causal model represents the official and administrative sector (Griffin, Pustay, 2007; Aswathappa, 2008).

Table 5: Operationalized latent exog. variable "Public- and Governmental Conditions"

PUBLIC AND GOVERNMENTAL CONDITIONS	
Independent exogenous latent Variable	P&G Conditions - Indicators for Operationalization
	<ul style="list-style-type: none"> - Avoidance of Trade Barriers - Low Corruption - Industrial Production Growth Rate - GDP Real Growth Rate - GDP per Capita - Tax Rate in % of Profit - Size of Company

(Source: Author's own construction in acc. to Griffin&Pustay, 2007; Aswathappa, 2008).

This latent variable shown in figure 17 consists indicators according to Griffin and Pustay's (2007) extended by indicators extracted from further literature resources.

An electronic based survey has been performed and sent to 481 potential participants from the German and Austrian Automotive industry. 138 participated at the survey which represents a return rate of 28,7%.

Implementation and Operationalization for postulated Causal Model

This model is the result of the extensive research work and developed by the author of this thesis. The aim was to determine the power of potential macro-economic impact factors on FDI intentions. It should diminish the lack of results in terms of the potential macro-economic impact on such ventures. The model is extended by potential intervening factors which may attract or distract managers for FDI decisions in the context of macro-economic perspective. The model is constructed for the B2B business activities only and the participants are entrepreneurs or employees exclusively from the German and Austrian automotive industry. Applying this model to other industries, countries, specific companies, etc. may need to adapt it to their specific environments and needs.

Following tables 6, 7 and 8 show the loadings of the indicators of the macro-economic var.:

Table 6: Operationalized latent variable "demand" with loadings

Independent Variable	Indicator Abbreviation	Factor loading (β)	Excluded from the final model (x). Tol.: <0,400
DEMAND (Expected Market Volume)	DEM1	0,747	
DEMAND (Expected Market Volume)	DEM2	0,754	
DEMAND (Expected Market Volume)	DEM3	0,476	
DEMAND (Expected Market Volume)	DEM4	-0,217	x
DEMAND (Expected Market Volume)	DEM5	0,586	
DEMAND (Expected Market Volume)	DEM6	0,792	

Source: Author's own construction

Table 7: Operationalized latent variable “supply” with loadings

Independent Variable	Indicator Abbreviation	Factor loading (β)	Excluded from the final model (x). Tol.: <0,400
SUPPLY (Production Factors)	SUP1	0,798	
SUPPLY (Production Factors)	SUP2	0,670	
SUPPLY (Production Factors)	SUP3	0,530	
SUPPLY (Production Factors)	SUP4	-0,031	x
SUPPLY (Production Factors)	SUP5	-0,205	x

Source: Author’s own construction

Table 8: Operationalized latent variable “public” with loadings

Independent Variable	Indicator Abbreviation	Factor loading (β)	Excluded from the final model (x). Tol.: <0,400
PUBLIC (and Governmental Factors)	PUB1	0,705	
PUBLIC (and Governmental Factors)	PUB2	0,465	
PUBLIC (and Governmental Factors)	PUB3	0,752	
PUBLIC (and Governmental Factors)	PUB4	0,240	x
PUBLIC (and Governmental Factors)	PUB5	0,521	
PUBLIC (and Governmental Factors)	PUB6	0,199	x
PUBLIC (and Governmental Factors)	PUB7	0,753	

Source: Author’s own construction

The remain operationalized latent variables have been put into the causal model for further investigation.

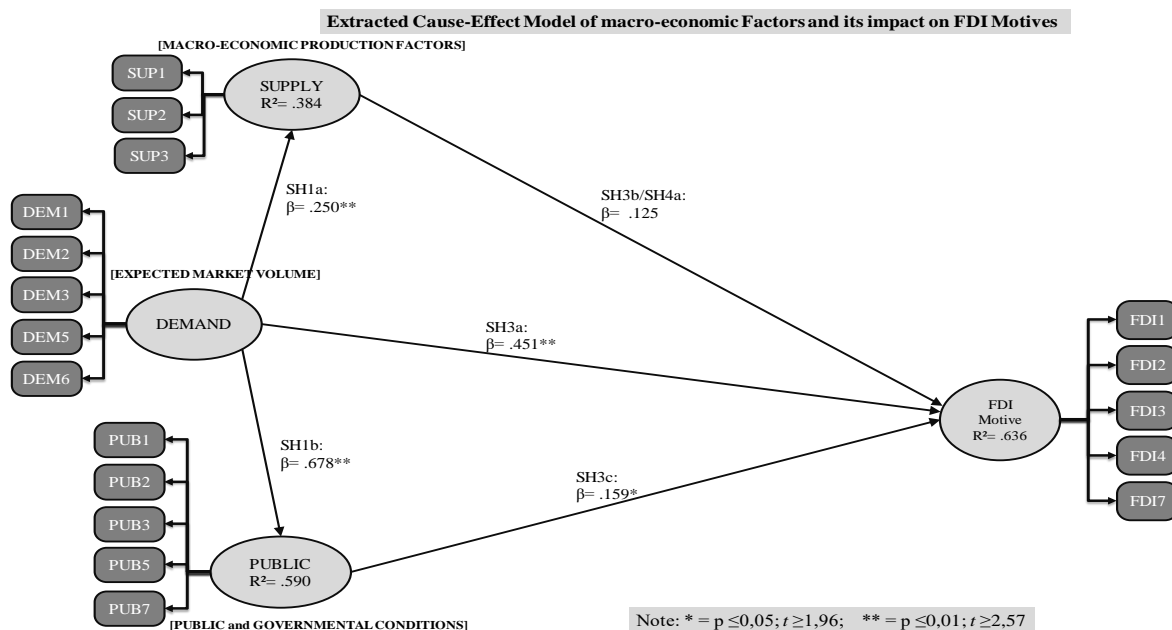


Figure 1: Final postulated causal model including p -values and R^2
(Source: Author’s own construction)

Fig. 1 shows the adapted postulated model to analyze the various impacts of macro-economic factors on FDI motives. It represents an only an excerpt of a holistic case-effect model developed by the author, which finally includes also a risk and uncertainty factor as well as potential positive factor, the fiscal incentive schemes for foreign direct investors given by governments, public industry sectors or political institutions.

Implications

The FDI motive is highly explained by the macro-economic independent variables including the intervening variable risk/uncertainty with a value of 63,6%. That means, that only 36,4% are explained by other variables which have not been included into the model. So, macro-economic factors have a strong influence on the FDI motive and if they vary, also the FDI decision will be influenced in both ways, negatively as well as positively. The main importance is linked to the demand factor with a strong positive impact on FDI ($\beta = .451$). This implies, that the expected market development has the strongest impact on investor's FDI willingness.

It is suggested, before taking decisions on FDIs, not just taking care of micro-economic factors, such as customers, products, suppliers, etc. as this is often the case, but also having a deeper look on the macro-economic environment in the host country. This environment impacts the company on a mid- and long-term perspective and can't be changed directly by the company but has direct and continuous impact on its business activities.

As the different impact levels of the macro-economic variables show, managers in the FDI decision making process should do an in-depth analysis of the potential intervening factors during FDI ventures. It is obvious, that growing markets or existing customers are strong drivers, but keeping also other hindering factors into consideration as those can sensitively influence business activities. It is suggested to take local consultants or agents getting information about current situations as well as outlooks on the mid- and long-term perspective.

Conclusions

The main part of the existing research results in terms of influence factors on FDI decisions are focused on the internal perspective and the immediate environment. The macro-economic perspective is only partly considered. The empirical evidence of not directly influenceable macro-economic factors by companies was just rarely available. Macro-economic factors are differently and inhomogenously defined in theory. A collection and comparison of the factors to gain specific variables and its indicators were of high importance for the further investigations of this work. They built the core part. A differentiation between the macro-economic variables was necessary to get a diversified view, and subsequently measures to evaluate each factor about its impact on other factors. The three main variables have been differentiated into Demand = Expected Market Volume; Supply = Production Factors and Public and Governmental Conditions.

The factor **demand** in the model has the strongest positive and significant impact on FDI motives out of the three defined macro-economic dimensions ($\beta = .451$; $p = 0,000$; $t = 4.053$). It can be concluded, that an expected market volume therefore is more important or even a stronger driver than production cost of better and more stable public and governmental conditions. The main opinion of the experts in the post-survey interview was, first comes the market and its potential, second, good and stable conditions are the bases for economic success, and third, production cost are an added value for the whole investment and can secure it on the long-term perspective.

The **public and governmental** conditions also have a positive impact on FDI motives, they are much weaker than the expected market outlook and are more seen as supporting factors from the experts. The public factor has a loading of only $\beta = .159$ on FDI motive. It can be concluded, that public and governmental conditions are important in the second step of an FDI project. The market conditions need to show positive trend, then public and

governmental factors getting more in the focus of the companies to be able to evaluate the fluctuations in terms of instabilities, legal changes, contract enforcement etc. Those supporting factors are important also to evaluate the influenceability and controllability of the company's investment on a future perspective.

The **production factors (supply)** also have a positive influence on the FDI motive, but again weaker than demand ($\beta = .451$) or public and governmental conditions ($\beta = .159$) with a factor loading of $\beta = .125$. Also the significance level of this factor is weak ($p = >0.05$; $t = 1.685$). Production factors seem to be not the main influence factors on FDI motives. Others, such as expected market volume are more strongly related to the FDI motive.

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Development of omni-channel sales structures in the consumer electronic retail chains in Albania

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Abstract

The article aims to study the development Omni-channel sales structures in the consumer electronic retail chains in Albania. The increase usage of Web 2.0 applications and technologies has created emerging opportunities to link the customer's physical and online world. Currently this opportunity represents challenges toward the integration of stores and online commerce platforms developed from the chains. Integration of the information within the channels is the main objective to develop in order to perceive an omni-channel sales structure.

Social Media can be seen a potential tools to interact with the customer and make their shift to the electronic commerce. Creating a customer engagement in the online brand communities can be used to understand customer needs online. Through a case study of the main consumer retail chains in Albania, we will create the theoretical path of development of customer interaction in the sales channels of the chains.

Keywords: Omni Channel, Web 2.0, Social Media, eWOM

Main Conference Topic: Marketing, Marketing Strategy

Introduction

Retailing is an industry that faces steadily with the final consumer. This approach has brought about constant changes in retail practices because of numerous technological developments made to serve customers on the one hand and to better control and understand the sales process on the other. Nowadays retail sales categorizes into four main structures. First structure include retail sales where there is only one retail channel available to the customer (single-channel retail). The second structure include retail sales where all sales channels are available to the customer but not integrated among them (multi-channel retail). The third structure include retail all sales channels are available to the customer and are integrated with cross-channel retail. The fourth structure presents the case where all sales channels are available to the customer at the same time (omni-channel retail).

Nowadays, we see that most of the retailers are aiming to go to the omni-channel structure, to create a better experience for their customers. Such a strategy aims to create even greater access to customer purchasing data. In such a way, the data provided will not come only from one channel but from multiples channels. If you consider the e-commerce website and the social media, purchase information linked to these platforms includes additional information about the customers that in other sales channels it is very difficult to obtain. Meanwhile, if retailers perceive that there is no integration option between their retail sales channels, then the only solution they can apply is multi-channel, as a choice to offer variety

of experiences to their customers. Likewise, even in the costumers' view, if they do not perceive that there is a channel integration in the retailer sales channels, they will use the channels independently of each other. Unless the customers understands that there is complete integration between the sales channels, then they will easily pass from one channel to another during the purchase process, thus accepting to provide even more detailed information due to the trust of created on the sales channels of the retailer.

Literature Review

Development of retail sales structure cannot be arrange without firstly understanding the evolution of retail in its own, through technological platforms following the concept of Web 2.0, Social Media and electronic Wourd of Mouth Marketing. All these concept combine together to better understand the path of development and to which extend retailers can integrate different sales structures.

Retailing through physical stores has been for a long time the only selling channel that the customer had to buy the desired goods and services from retailers. With the technological development as a whole and the creation of Internet access, a new channel for the sale of the company's products was created. While the two channels, at the beggining operated separately and independently from one another, the importance of combining retail sales via the internet with the ones realized in the physical store was mainly related to the further development of consumer experience (Otto & Chung, 2000). Thus, buyers tend to shop by using several sales channels simultaneously, where they can search the product online, but the final product purchase and withdrawal process can be done in the physical store (Burke, 2002). Eventhough different sales channels were developed in the past, as the authors Grewal et al (2004) point out, "no other technological innovation has received such great attention from retailers, producers, consumers and the public in general as it is dedicated to retail sales via the Internet or e-tailing. Indeed, any other form of competition does not endanger so much the traditional retail form of retail sales via the internet." This concept, should not and can not be seen, seperated from the bigg development of the internet as the platform under the concept of Web 2.0, which according to O'Reilly (2005) is "the business revolution in the computer industry caused by the online movement as a platform and the attempt to understand the rules of success in this new platform". Normally, including different sales channels in the retailer sales structure, creates the opportunity to increase revenues by gaining a bigger customer database (Chatterjee, 2006). This is closely related with the concept of timing and location of the physical store which are two main limiters for customer to buy in different timing and from different places.

Customer experience developed through different sales channels of the retailer has a direct impact on satifaction and future customer retention as well (Shankar, Inman, Mantrala, Kelley, & Rizley, 2011). Normally the retailer has bigger chances to gain customer attention by using different selling tools. This opportunity creates the idea of presenting the product in different locations and with a different style folling the concept of "showrooming" the products to the final customer (Zhang & Oh, 2013). In order to better understand the differences between sales channel structure we need to clarify the concept of omni-channel. One main deffinitions of omni-channel management represent it as "the synergetic management of the numerous available channels and customer touch-points intended to optimize the customer experience and performance across channels" (Verhoef, Kannan, & Inman, 2015). Anyhow, it is difficult for the retailer and customer to understand firstly and then to decide which sales channel structure is currently presented. Eventhough retailer can

have different sales channel, it is not easy to say if we are working under a multi-, cross- or omni- channel structure. To have a better assessment we need to clarify the differences between these structures. Differences between multi-, cross- and omni- channel sales structures, can be present in a lot of ways, but mostly they are focused on the concept, degree of integration, channel scope, customer relationship focus: brand vs. channel, objectives, channel management, customers, retailers, sales people and data provided (Mosquera, Olarte Pascual, Juaneda Ayensa, 2017). All challenges presented under these categories makes it easier to evaluate channel structures and decide which one is more appropriate and possible to implement.

Development of omni-channel sales structure creates a wide interaction with customers, which normally goes beyond commercial point of view. In the today world of fully integration social media platforms and communication tools, retailers can be part of special moments and events of their customers. Understanding social media "a set of Internet-based applications built on the ideological and technological basics of Web 2.0 principles, allowing the creation and exchange of produced materials by users"(Kaplan & Haenlein, 2010), leads to the idea that through the omni-channel sales structure the retailer can produce higher volume of materials that can be shared online. All these information creates a better understanding of the retailer sales structure where the customers experience the real product in the physical store and create interaction through reviewing it on the online store and social media. In this way, retailers makes it easier sharing the information through the customer and enhance further the word of mouth communication. Interaction of customers and retailers online develops further their communication, trending the electronic Word of Mouth Marketing, which can be found as Buzz Marketing and Mouse Marketing as well. In terms of online interaction development, retailers need to be careful in the image and perception they create, which should use specific tools and instrument to further broad the perception of the customer (Dellarocas, 2003).

Research Methodology

The aim of the research is to generate understanding of how consumer electronic retail chain in Albania have developed their sales channels over the years and if retailer and customer perceive these channels organized as multi-, cross- or omni-channel structure. The research objectives are to explore the patterns of interaction, orchestration and effect that enact by consumer electronic retailers to achieve a competitive advantage through the usage of all possible sales channels. To meet these objectives the information was gathered data through qualitative interviews and secondary sources from a case study of four biggest consumer retail chains in Albania. A case study is appropriate when researching "the complex processes of contemporary marketing management" such as understanding the clear sales structure of the consumer electronic retailers in the Albanian market (Kapoulas & Mitic, 2012). The purpose is not to generalize to any population but to present a real world situation that has been uncovered. A case study design aims to present clearly our revelatory case (Yin, 2003).

The study presents finding within four major consumer electronic retail chains in Albania. The physical location data was gathered through the search of financial information in the National Registration Center of Albania, where business provides details in terms of location of their stores in cities and streets. In total the four main consumer electronic retailers have 59 physical store and 4 online stores. Sales channels through catalog or telemarketing were not applied from them. Main product categories served through these

retailers included TV and Audio, Photo and Video, Major and Small domestic Appliances, Mobile Phones, Consoles and Games, Health Care Products, Gadgets and Accessories.

The study presents data collected in January 2018. In order to avoid incomplete and vague information, the interview conducts in the companies of the interviewer, providing relevant explanations about different points of the study aim. In order to maintain the confidentiality of the business, only the name of the retailers has been presented in the paper. Meantime other sensitive data is not present in the presented. In addition, the study was limited to what are a structured consumer electronics retailers in Albania. The interview conducts with key management persons of the marketing and commercial department, who had knowledge about marketing, managerial and technological processes related to the company. Interviews started by discussing experiences of developing the physical store sales channels and the evolution to the online sales channels. Than the interview included discussion about the perception of integration between the sales channels. Respondents discussed three broad topics: the evolution of sales channels, their perception for sales channel structure and usage of social media in the sales channels.

Limitations and Further Research

The aim of this exploratory research was to generate a substantive understanding of the way that the consumer electronics retailers managed the development of their sales channel structure. Due to the nature of the chosen research methodology, the findings, which emerge from this study, cannot generalize to a wider population or other retail industries as well. There is a plan for future development of this research by moving beyond a single revelatory case and studying a wider sample of industries like retailers in home furnishing, health and personal care industries.

Study Results

Study results divides in three main section including the evolution of sales channels structure of consumer electronics retailer, their perception for their current sales channel structure and usage of social media for these sales channels.

Evolution of sales channels

The main four consumer electronics retailer presents an evolution which start from the beggining of the year 2000 and on. Eventhough some of them have business starting from the 90s still their retail structure took a longer time to develop. At first physical stores were located in big cities like Tirana, Durrës, and Vlora. In the recent years, they have spread in different small cities to cover more market. Details about the split of the stores through the retailers presents in the Table 1.

Table 1 - Consumer Electronics Retailers in Albania

Retailer	Physical	Online	Catalog	Telemarketing	Total
Aza Electronics	10	1	0	0	11
Globe Shops	13	1	0	0	14
GoTech	13	1	0	0	14
Neptun	23	1	0	0	24
Total	59	4	0	0	63

As per the interview conducted with the marketing and commercial teams, all of them consider the physical store sales channel as the main part of their sales structure. According to their feedback the importance emerged from the fact that in the current market situation, consumers are still investing on major domestic appliances like washing machines, refrigerators, dishwashers, cookers and so on. Taking in consideration the user of these appliances at home they argued that the buying decision for these products was in the age range of 25 - 55 years old. The online retail store was a novelty part of the sales channel structure, which presented in the past 5 years, since 2013. Normally it started as a catalog for presenting the products and arranging the transactions to the physical store at the beginning. Since 2015, with the evolution of Albanian online payments systems from the local banking system, sales through e-commerce platforms became possible.

Perception of current sales channel structure

According to the interview data, currently all of the consumer electronic retailers perceived that they have a multi-channel sales structure. Taking in consideration that for product categories such as major and small domestic appliances, tv and audio usually they were arranging the sales through the physical store. Meantime for mobile phones, consoles and games the online sales channel was developing fast. According to them, the usage of online sales platform provided relevant information to understand what features the customers were more interested. With different Web 2.0 tools applied in the online sales platforms, the retailer managed to gain insight about timing their users were passing on each product by understanding the effect of promotions, pricing structure and other product features. As per the comment of the marketing specialist of one of the retailers “Starting a selling process in one of our channels and closing it in the other one, is still not available due to technological reasons. Our online selling system integrates with our financial system, but not with our point of sale system. This is something that manages in the back end ERP system and we can have data on it, but in the real time selling process, is still missing. To manage this part it is important to understand that physical and selling platform should be the same entity and just to divide sales staff and customers by user rights”.

According to the commercial manager of one of the retailers, “Multi-channels sales structure is the most common structure you will find in the consumer electronic industry because the online payment system is still under development in Albania. Even though that user are buying products from online retailers like Amazon or AliExpress, still if they would find those products in our stores they would decide to visit the physical store before making the purchase”. Development for omni-channel sales structure could be faster if cross and up selling techniques could implement with customers purchasing behavior. Normally the customer could buy the mobile phone in the physical store, but additional accessories they can view in the online store due to the limitation of space in the physical store. After deciding, they would choose pick-up on store option and in this way would create a first approach to omni-channel concept.

Normally development of omni-channel sales structure is a combination of technological development and buying behavior. Taking in consideration the consumer electronics retailers’ evolution in Albania, time and effort focuses on the physical store development. With the starting of the online sales channels, we can see the first attempts to go to the omni-channel concepts, by promoting online and selling offline products. These approach aims to create a pattern of integration between the two sales channels. Normally the switch of the channels occurs in different stages of the purchase process, but the importance

is that all the data regarding the same customer to be stored. All these information helps the retailer to understand customer behavior toward products and other retailer aspects. This logic can be more clearly set out through an example of purchasing a smartphone from a consumer electronic e-commerce website. In this website the customer gain information for different product details such as design, technology, digital camera, memory without having the restriction of timing and location that the retailer physical store would impose. Also, the customer can make a better comparison of the possible alternatives in the online sales channel, by comparing the various products in detail. This information base can be further enhanced if, in the online sales channel, the company has created the opportunity for other customers to leave their product ratings and impressions about the product. Such information already makes it possible for the customer to have a perception other than the information the company offers about the product. In this way it is possible to obtain even more detailed information about other customer experience that other persons have had with the company. In order to benefit from the experience of touching and use it in real time, the consumer will need to be redirected to the physical store. At this moment, he can also get detailed information about those items that may still have been left unanswered by the search done on the Internet. Normally taking in consideration the experience of physical store sales team, it would be possible to have clear demonstration about options and features just explained in the online sales channel. The interaction of the customer with the sales team, itself serves to create a better relation funded on trust principles.

Usage of social media from consumer electronics retailers

Social media usage it has a big importance when it comes to develop the retail sales structure. All the shared information through these platforms helps the consumer electronic retailer to understand trends and patterns for new product development. Even though customer cannot buy in the social media platforms, one of the marketing specialist interviewed argued, "Social media help in combining the communication for both sales channel. Normally we are doing promotions through both channel to motivate customers to use the other, but still all of these advertising is coming from us. Customers wants something to be less related to business and more related to their community and friends. For these reason we have included different social button to our products. Our customers can like a product in Facebook, Twitter and as well share it to other social media platforms. In this way if the find something that might interest to a friend they can even refer it". This is a clear approach of combining social media apps and features to gain customer attention, especially in the online sales channel.

Anyhow, even the opposite has started to create a big attention on the consumer electronics retailers, in using social media channel for promotion of physical and online sales channel. As cited by one of the product managers "We are using social media to promote novelties in our retail chain. We are waiting to introduce the Galaxy S9, during this beginning of the year and we intend to start the communication through social media, arrange pre-reservation in our online e-commerce platform and finally present the product in our physical store. This is a new strategy, which is helping us in firstly understanding customer perception about new product, then push them to interact with our products online". Using social media from consumer electronics retailer present the chance to make an easier switch between channel serving as a tool to ease the boundaries that are existing between physical and online sales channels. Normally, customers perceive social media communications as informal one with a language, which relates more to product benefits and features and not to the retailer image development. Action on these communications from friends through likes, comments

and shares makes it even easier for the customer to trust and engage in such communication. This customer engagement offers the chance to switch from different sales channels by providing relevant information and experience on each of them.

Conclusions

Consumer electronics retailers in Albania provides a multi-channel sales structure. This relates to the current development of the market, where the focus is to create a better customer experience in the physical store. Online sales channel have started to function but still their usage is mostly limited in product and availability information. Due to the low level of online payments development in Albania, pick-up on store is one of the most used options in the current online sales channels. This option is a great tool to develop the sales channel structure from multi-channel to omni-channel. Taking in consideration the information and action delivered in the online site and the buying process in the offline site, retailers can create the path for future development. Communication can be two ways from offline to online and vice versa.

In order to facilitate the evolution of the consumer electronics retailers to omni-channel sales structures we can develop social media presence. Social media platforms serve to make a more informal interaction with the customer, aiming to push them for buying and visiting the online store. Usage of social media elements in the online store, such as product liking and sharing help in creating opportunities to the customers to use retailer information and present it to their community and friends. This user engagement is higher during the presentation of new products and innovation.

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What are the key drivers of growth in brics? An empirical judgement

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Abstract

In the last decade, the economic performance of BRICS, namely Brazil, Russia, India, China and South Africa, is widely discussed in economics literature. Since they are expected to be the world's leading economies, the key drivers of economic growth have appeared to be the main issue of concern. In this regard, we aim to investigate the major determinants of economic growth in BRICS by employing both static and dynamic panel data methods over the 2000-2016 period. We conclude that trade openness, investment and saving rates, research and development (R& D) expenditures, financial development, and partially education affect the economic growth.

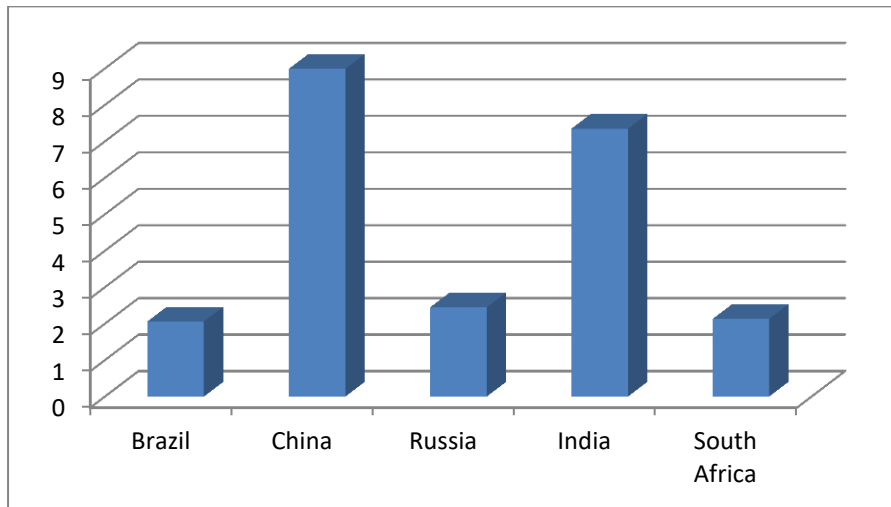
Keywords: BRICS, panel data, growth

Main Conference Topics: Macroeconomics

Introduction

The report of Goldman Sachs by Wilson and Purushothaman (2003) determines some key points about BRICS including the prediction that those economies could exceed that of the G6 in terms of US dollars in less than 40 years and could reach half of the the size of the G6 by 2025. Likewise, Jorgenson and Wu (2013) assert that China would displace the U.S. as the world's leading economy and India would overtake Japan. This would shift the balance of the G20 from the leading industrialized economies of the G7 to the emerging economies, especially China and India whose high economic performance is presented in Figure 1. After then, the attention has more centered on those economies and concordantly the literature has evolved to examine the growth dynamics of BRICS.

Figure 1. GDP Growth (% Annual) of BRICS



Source: The figure is generated by using data from World Bank (2017).

In the regarding literature, several studies attempt to examine the key determinants of economic growth. As one of those studies, Wilson and Purushothaman (2003) describe openness, specifically to trade and foreign direct investment, as one of the underlying factor for growth. On the other hand; Yuan (2013) focuses on education as a determinant that contributes to their economic growth. They find that although Russia and Brazil invest more in education than China and India in terms of the rate of educational expenditure to the total GDP, the economies of China and India are growing faster than Russia and Brazil. Likewise, Jorgenson and Wu (2013) emphasize the change in economic growth theory which substitute the innovation by investment in human and nonhuman capital. On the other hand; Dam and Yıldız (2016) investigate the growth effect of R&D and innovation for BRICS. Moreover, some studies such as Ono (2012) questions the financial development and growth nexus.

From this point of view, we aim to investigate the growth profile of BRICS. In addition to the literature propounded above, we also analyze the effect of savings and investment rate which are crucial factors that determine income levels. We utilize both static and dynamic panel data methodology to examine the determinants of growth over the 2000-2016 period of BRICS economies.

Our paper is organized as follows. In section 2, we describe the model, data and methodology implemented in the study. We present the empirical results of the model in section 3. Finally, in the final section, the basic findings of the study are explained.

Related Work

There have been two important discussion on the framework of economic growth theory. One of them is neoclassical growth theory and the other is endogenous growth theories. Their main focus factors are the accumulation of physical capital and human capital development (see, among others, Solow 1956; Romer 1986; Lucas 1988). However, there have been other important contributions to economic growth literature that focus on the impact of efficiency factors (Easterly and Wetzel 1989; Barro 1990) or the determinants of

institutions and legal, demographic, geographic, socioeconomic and political factors (Barro 1999, 2003; Sachs and Warner 1997; Burnside and Dollar 2000).

Recent studies generally focus on panel data analyses to determine economic growth. Anyanwu (2014) analyses African and Chinese economy using both panel data and time series analyses. As a conclusion, domestic investment, and trade openness and secondary school enrolment are positively and significantly associated with economic growth. Chirwa and Odhiambo (2016) examined developed and developing countries and at the end they find in developing countries the key macroeconomic determinants of economic growth are foreign aid, foreign direct investment, fiscal policy, investment, trade, human capital development, demographics, monetary policy, natural resources, reforms and geographic, regional, political and financial factors. In developed countries, determinants that are associated with economic growth include physical capital, fiscal policy, human capital, trade, demographics, monetary policy and financial and technological factors.

Model

To examine the determinants of growth in BRIC countries, our study utilizes the following model. We present the description listed and explained in table 1 of the variables in (2.1) to internalize the model better.

$$gr = gr(open, inv, sav, rd, edu, school_pri, school_sec, finance) \quad (2.1)$$

Table 1. Description of Data

Variable	Description
gr	gdp per capita growth (annual %)
open	trade openness
inv	gross capital formation (% of GDP)
sav	gross domestic savings (% of GDP)
rd	research and development expenditure (% of GDP)
edu	government expenditure on education (% of GDP)
school_pri	primary school enrollment rate
school_sec	secondary school enrollment rate
finance	domestic credit to finance sector (% of GDP)

The trade openness (open) is measured as the sum of exports and imports of goods and services as a share of GDP, commonly utilized in examining the determinants of growth. We use the domestic credit provided by financial sector (finance) as a proxy for financial development. The effect of investment (inv), measured as the gross fixed capital formation, on economic output constitutes a prominent strand of economic theory. The potential importance of human capital and research & development is obvious in examining the growth potential of economies. Thus, as indicators, we include government expenditure on

education, school enrollment rates and R & D expenditures. Finally, we also use the saving rate (sav) which is evaluated as an engine of growth, especially for BRICS.

The models are estimated by using unbalanced panel data for 5 economies (Brazil, Russia, India, China and South Africa), which are named as BRICS countries, over the period 2000-2016. We provide the series from World Development Indicators (WDI) of The World Bank (2017).

Implementation

As for methodology, we apply panel data analysis which enables to analyze cross-sectional units ($i=1, \dots, N$) and time dimension ($t=1, \dots, T$) simultaneously in the framework of (2.2) as below:

$$y_{it} = \beta_0 + \beta_1 x_{it} + \varepsilon_{it} \quad (2.2)$$

Here, y_{it} indicates the dependent variable which is the economic growth defined as the annual growth of GDP per capita. x_{it} stands for explanatory variables presented in Table 1. Firstly, we implement 2 alternative static panel model specifications, namely fixed effect (FE) and random effect (RE) models. Fixed effect model assumes the existence of time-invariant characteristics which are unique to countries without any correlation with other individual characteristics. In this regard, the model removes those time-invariant differences between countries to control for unobserved heterogeneity. Apart from fixed-effect model; random effect model is based on the assumption that the variations across countries are random and not correlated with the regressors. As asserted by Greene (2008), a vital distinction between fixed and random effects is whether the unobserved country specific effects encapsulate elements which are correlated with the regressor of the models independent of the stochastic characteristic of those effects. Accordingly, we select the appropriate model by employing Hausman specification which tests the null hypothesis of no correlation between the regressors and error terms. The rejection of null hypothesis leads to the selection of fixed effect model.

To avoid the bottlenecks of static panel data analysis, we also apply dynamic panel data methodology which eliminates not only the cases of unobservable factors correlated with the dependent variable and explanatory variables, but also the dependent variable influencing the regressors. Following the growth literature, we utilize general method of moments (GMM) model to control both the potential endogeneity stemming from the correlation between independent variable and error term, and remove the unobserved individual country effects which potentially lead to estimate of biased and inconsistent parameters. As an approach in GMM methodology, Arellano and Bond (1991) suggest the method of differencing to eliminate the individual fixed effects. The difference GMM approach of Arellano and Bond (1991) is presented as follows:

$$\Delta y_{it} = \alpha_0 \Delta y_{it-1} + \alpha_1 \Delta x_{it} + \Delta \varepsilon_{it} \quad (2.3)$$

As the final stage of the methodology, we investigate the consistency of GMM estimators by using specification tests which analyze the serial correlation properties of error terms and validity of instruments with regard to Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). In this regard, after implementing Arellano-Bond test of autocorrelation, we apply Sargan test of overidentifying restrictions which

examines the suitability of used tools. Rejection of both null hypothesis of autocorrelation and Sargan tests eliminates the model misspecification problem.

Results

The results of linear panel data analysis are presented in Table 2. It seems that our static and dynamic panel estimates differentiate to some extent. Fixed effect and random effect estimates commonly suggest that investment and saving rates have statistically significant impact on the growth of BRIC economies. Moreover, FE estimates indicate that R&D expenditures have a significant positive effect as well. On the other hand, RE results suggest that primary school enrollment rate has also an effect on growth performance of BRIC economies. Since Hausman test suggests that FE estimates are more appropriate, we conclude that the investment, saving rate and R&D expenditures are important variables in the linear model estimates.

Table 2: Estimation Results of Static Model

Regressors	Fixed effect	Random effect
open	0.066 (0.69)	0.019 (0.05)
inv	-0.986*** (0.25)	-0.269** (0.14)
sav	0.812*** (0.20)	0.438** (0.17)
rd	8.393* (4.57)	1.666 (3.37)
edu	-0.655 (0.68)	0.126 (0.66)
school_pri	-0.005 (0.052)	0.079* (0.04)
school_sec	0.053 (0.083)	-0.078 (0.05)
finance	0.066 (0.05)	0.015 (0.02)
constant	-10.82 (9.13)	-7.55 (7.78)
Hausman test (p value)	0.0243	

Notes: The parenthesis implies standard errors. ***, **, * show significance at %1, %5 and %10, respectively.

On the other hand, dynamic panel estimates suggest that an increase in saving leads to a statistically significant rise in growth rate which is consistent with the linear models. Difference GMM estimates also suggest that R&D expenditures and financial development have a positive significant effect. However, unlike fixed and random effect results, we also find significant impact of openness on growth in dynamic panel estimates. Furthermore, while in dynamic model primary school enrollment rate significantly induces the rise in gdp per capita, we could not find any evidence supporting the effect of government education expenditure on growth. Here, the effect of spending on education should be considered together with the quality of education. Finally but interestingly, investment is found to have a significant negative effect on growth for BRIC economies both in static and dynamic models. This result indicate that the growth dynamic of those economies is independent from the rise in investment. In other words, the rapid progress in economic performance of BRICS despite the fall in investment can be attributed to other sources of growth.

Table 3. Estimation Results of Dynamic Model

Regressors	Difference GMM
Dep. Var (lag 1).	-0.11*** (0.01)
open	0.335*** (0.12)
inv	-2.210*** (0.46)
sav	1.655*** (0.06)
rd	2.622** (1.29)
edu	0.939 (1.44)
school_pri	0.067* (0.03)
school_sec	0.061 (0.17)
finance	0.083*** (0.02)
AR(2) test (p value)	0.2023
Sargan test (p value)	0.4118

Notes: Robust standard errors are indicated in parenthesis. ***, **, * show significance at %1, %5 and %10, respectively.

Finally, in GMM specification, we conclude that the lagged value of dependent variable (gr_{t-1}) is statistically significant. The null hypothesis based on the validity of overidentifying restrictions cannot be rejected with regard to Sargan test. Furthermore; according to AR (2) test results, we find no evidence of autocorrelation problem.

Conclusion

In general, BRICS countries distinct cultural and linguistic traditions, though they share the characteristic of having been recognizable political entities for centuries. All of them have modern industrial sectors, with ever deepening links to the global capitalist economy, along with large areas of the economy that operate informally and outside the reach of regulators and tax collectors.

Our paper examines the major determinants of growth for BRICS by applying static and dynamic panel data methods over the period 2000-2016. We find that the rapid growth performance of BRICS stems from trade openness, high saving rates, progress in R&D and financial development.

However, we find weak evidence supporting the effect of education on growth which questions the quality of the education. We conclude that merely one indicator of human capital, which is primary school enrollment significantly affects the economic growth for BRICS. Another unexpected result of our study shows the negative impact of investment on growth. This result could be attributed to the crowding effect of government investment expenditures on private investments, or failure in efficient prioritization of investments areas to induce growth. On any ground, this result is worthwhile for future research

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An Exploratory study on Accommodation sharing at Lake Balaton

Examination of Review system at Airbnb

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Abstract

In sharing economy model people share their home, car, tools on Internet platforms that might cause change in the traditional industries. It has a lot of different impact on society and environment; it means efficient utilization of physical assets, it reduces their environmental impact and can enhance new social contacts. This new phenomenon disrupts the hospitality industry, transportation and job market as well. Sharing economy caused vast changes in the four main areas of tourism: accommodation (Airbnb), transportation (Uber), dining (Eatwith) and tour guiding (Google Local Guides). To establish and maintain the trust in the online market places among the participants an online feedback system has been developed. Online reviews have shown as important information that affects consumers' online shopping behavior and decisions. This paper focuses on the accommodation sharing and the chosen area is Lake Balaton in Hungary. The purpose of the research is to investigate the two-sided review system in Airbnb, collect data and identify the characteristics of hosts and guests at Lake Balaton.

Keywords: sharing economy, accommodation sharing, review system, Lake Balaton

Main Conference Topic: Tourism

Introduction

In recent years sharing economy has experienced rapid growth and according to the forecasts this phenomenon will experience extreme development over the next decade (Schor & Fitzmaurice, 2015). One of our biggest challenges is to find a sustainable, long time working system which is good for the society, the environment and the economy as well. From this perspective, the sharing economy, in other words a more collaborative approach to the exchange of goods and services is particularly essential because there is an outstanding demand for a new system.

As it is known, tourism is an economic important and diverse phenomenon that affects both the travelers and the population of tourist facilities. It brings significant financial profit to the economy and contributes to the social economic development of the regions. From this reason it is essential to be aware of changes that new accommodation form can cause and influence the future dynamics of the hospitality and tourism industry (Guttentag, 2015; Sigala, 2015). The main purpose of this paper is to examine the characteristics of Airbnb accommodation sharing portal in a selected area, Lake Balaton in Hungary. The study investigates the fundamental part of the sharing economy; the online review system. It drives to better understanding of the system and appoint future research areas.

Literature review

The purpose of this section is to give a deep view about sharing economy, its characteristics and to introduce the online review system that has been developed to enhance the trust between the participants.

Sharing economy – accommodation sharing – the case of Airbnb

Sharing economy lacks a common definition; it includes a wide range of monetary or non-monetary exchanges (Palgan et al., 2017). It is also called collaborative economy or access economy or connected consumption, is an expression for the emerging type of business models, platforms and exchanges (Allen & Berg 2014). The central point of this new phenomena or business model is the utilization of underused assets facilitated by ICT (Palgan et al., 2017). It is a fast-growing sector which is disrupting the mainstream industries (Cohen and Munoz 2016). The sharing economy is currently really popular business form; the total turnover from sharing services will increase from 15 billion to 335 billion US dollars between 2015 and 2025 and it will provide half of the whole turnover of the industry (PWC, 2015). While in the neoclassic market the money taken to profit ownership of a product, sharing economy structure demonstrates the benefit of capturing value with short term access-rights to a product or service (Daunoriené et al. 2015).

This more collaborative approach to the exchange of goods and services is particularly essential because it has a positive message about a trustworthy; low-carbon economy which is more transparent is a great opportunity to create a business with these positive consequences (Schor& Frenken 2017; Martin 2015).

Sharing economy has impact on traditional businesses such as accommodation, transportation, mobility industry. In this paper the accommodation sharing is examined. There are bunch of companies who are dealing with accommodation sharing, home-swap and short-term accommodation sharing worldwide: Homestay, Couchsurfing, Love Home Swap, Home Exchange, Bedycasa, Culture Go Go, Wwoof, Homestayin, Casa Particular, Cuba (the Guardian, 2015) but the most famous is Airbnb.com. Airbnb was founded in 2008 and it is a popular online marketplace for short-term accommodation rentals. The booking services are available in 190 countries and more than 2 million listings worldwide. Approximately, 60 million guests have used the service in 34 000 cities (Airbnb.com, 2017). The company offers a new model of bed and breakfast built on the collaborative consumption model (Guttentag, 2015). Specifically, Airbnb is a peer-to-peer accommodation renting platform catering to hosts and travelers. Hosts can use this webpage (or application) to offer their underused space (flat, room etc.) and rent it out to others. Travelers use the site to book and stay at another person's flat. In other words, Airbnb is a third party between hosts and travelers and charges fees to both parties.

Online feedback system – Stars and Ratings

In case of traditional and online marketplaces every transactions requires some level of trust between the participants that is usually provided by the law or other tools (Tadelis, 2016). However the buyer and seller do not know each other on the online marketplaces, therefore an evaluation system (online feedback system) has been developed to enhance the trust between the participants. The basic idea behind this concept is that today's activity will lead to future consequences that can influence the future business of seller. Specifically the importance of online feedback system is to provide future buyers with a window into the seller's past behavior who have not previously met with help of previous buyers' experience in anonymous marketplaces (Tadelis, 2016).

There are two big different online feedback systems; one – sided and two –sided systems. In Table 1 there are some examples for these two types of systems.

Table 1: Review system in different online marketplaces (Source: own work based on Tadelis, 2016)

Company name	One – sided/ Two- sided
eBay	One – sided Buyer has 60 days to leave a positive, negative, or neutral feedback score for the seller. Sellers are limited to leave positive feedback or no feedback.
Taobao	One – sided If a seller leaves positive feedback for a buyer but the buyer leaves no feedback then the platform’s algorithm automatically records positive feedback for the seller
Amazon	One – sided Sellers leave no feedback at all
Airbnb	Two –sided Owners and renters leave feedback that is then aggregated and publicly observed by future marketplace participants
Uber	Two –sided Riders leave feedback, which is not public, drivers can see a rider’s feedback for previous rides before accepting a ride request, but riders see the driver’s feedback after the ride is confirmed.

In terms of sharing economy, the concept of “sharing” is not an innovation: the practice of sharing has a long time history; it has been a practice between family members, friends, neighbors or trusted social contacts, however the “stranger sharing” is a new phenomenon (Schor 2014). With the emergence of online marketplaces, the trust received a new role among the users. Consequently, on the online platforms user-generated ratings have important role, however participants do not trust them exclusively (Bae, Koo, 2018) and empirical findings also prove that reputation measures not reflect to the performance totally (Tadelis, 2016). Buyers and sellers tend to give higher ratings because other people look their ratings they gave and if they see low ratings it could means that previous buyers have been difficult to please (Bae, Koo, 2018). Based on an analysis of ratings it is found that almost 95% of Airbnb rooms, houses, apartments have an average user-generated rating of either 4.5 or 5 stars (the maximum); practically none have less than a 3.5 star rating (Zervas and Prosperio, 2015) so high ratings might indicate a norm so it does not have additional meaning (De Langhe et al., 2015). Low ratings can refer to a weak performance by hosts and it might require special attention by guests that they have to be careful and check other information regarding (text, pictures, response rate by host etc), however, high rating itself does not mean anything. It can be an average accommodation but it can be super high quality apartment too. From this perspective it is essential to know more about the online review system and to understand the participants so that a better system would be enhanced. At the beginning ratings (‘starts’) gave a direction to the potential buyers (renters) however there are several researches (Cabral & Hortacsu, 2010; Nosko & Tadelis (2015)) proving that this form is not enough anymore. People make their decisions more sophisticated ways knowing not only ratings but also other characteristics of an online marketplace.

Bae and Koo (2018) found that potential guests who are searching accommodations on Airbnb analyses more components during their searching process. People check the ratings but they are interested in this if it is low. It means that rating valence (high, low) does not have a direct impact on decisions; it has an anchoring role in the adjustment of consumers guiding people in selecting a signal to use.

They read the written reviews by other guests but they do not deal with the positive content except it is positive exceptional way (the host provides some extra gifts or services to the guests). Based on their cognitive style there are two types of people: visualizers who prefer pictures and readers who prefers the text. Authors found that if people when cannot make a decision because of lot of unknown factors, do not prefer decision heuristics that fit their cognitive style, they prefer the opposite; eg. Visualizers prefer text (Bae and Koo, 2018). This result shows that the decision making process is not based on the rating system only, there are much more factors that influence people during this progress.

In the next part of the paper a descriptive analysis is demonstrated with the help of literature.

Research question, methodology

The main purpose of this research is to investigate the review system in the chosen sharing economy portal, Airbnb. We select a specific area, Lake Balaton in Hungary, to investigate.

Lake Balaton is the largest lake in Central Europe that is located in central Hungary about 50 miles (80 km) southwest of Budapest (Fig 1.) (Encyclopædia Britannica.com). The regions around the lake have rich variety of plant and animal life, it is also known for its historic character and it is a splendid wine region.



Figure 1. Hungary and Lake Balaton

(Source: <http://www.travelsplace.com/europe/hungary/map.html>)

The Balaton region is Hungary's second most beloved destinations and travelling to the Balaton is becoming more popular by the international tourists too (KSH, 2016). The peak tourist season is between June and end of August because the average water temperature is 25 °C (77 °F) at this time which makes bathing and swimming possible on the lake (World Lake Database, 2018). Also, there are several famous thermal baths and spas (eg. Hévíz, Zalakaros, Igal, Tapolca) around Balaton which makes the region more attractive.

In terms of methodology, data was collected with the help of web scraping method. This method is data gathering for information from websites. In this stage the data was collected manually. A given period was selected: how many accommodations are available between 04 -08 July 2018 at Lake Balaton. The reason why this time period is chosen is because there are more festivals are going to be organized this week at Balaton. For example Balaton Sound, that is a famous electronic music festival.

Results

High ratings might not give additional information about the products or services in the online marketplaces which mean that other factors should be examined by buyers. Therefore in case of this examination a database is built with help of public available information on Airbnb website. Five towns are selected around the Balaton lake (Siófok, Balatonfüred, Keszthely, Balatonalmádi and Tihany) and all data related to the available accommodations are examined (Table 2).

Table 2: Examined towns around Lake Balaton (Source: own work)

Town	Number of accommodations	Number of accommodations with reviews	Number of reviews/ town	Average ratings
Siófok	54	16	91	4.5
Balatonfüred	46	12	136	4.5
Keszthely	28	6	103	4.5
Balatonalmádi	21	12	174	4.5
Tihany	5	2	37	4.5
SUM	154	48	541	4.5

154 accommodations are available for this period in the five selected towns. Based on the historical reviews, 48 rooms and apartments have written feedbacks by previous guests. It means 541 written reviews during the period June 2012 – February 2018. In case of all examined towns the average ratings is 4.5* that certify the previous results, namely it is difficult to choose a room based on the ratings.

Table 3: Accommodation types in the examined towns (Source: own work)

(*The full number of accommodation types can be seen in brackets)

Accommodation Types		Nr of accommodation
Boat (3)		3
Castle (1)		1
Apartment (65)	Entire apartment	52
	Entire cabin	4
	Entire condominium	9
House (26)	Entire house	17
	Entire villa	9
Private room (59)	Private room	18
	Private room in bed and breakfast (Guesthouse)	5
	Private room in casa particular (cuba)	1
	Private room in guest suite	5
	Private room in house	17
	Private room in resort	1
	Private room in serviced apartment	6
	Private room in townhouse	1
	Private room in vacation home	1
	Private room in villa	2
	Room in boutique hotel	2

In the examined towns at Balaton, mainly apartments and rooms are available for the chosen period (Table 3). The hosts (who are the owner or advertiser of properties) are tend to categorize the bigger groups in smaller types (eg. private room in bed and breakfast) to make it more popular among guests.

The popularity of accommodation sharing and the seasonality also are recognizable based on the written feedbacks (Fig.2.); from June 2012 more and more people rent room or apartment near to the Lake via Airbnb and share their experience online.

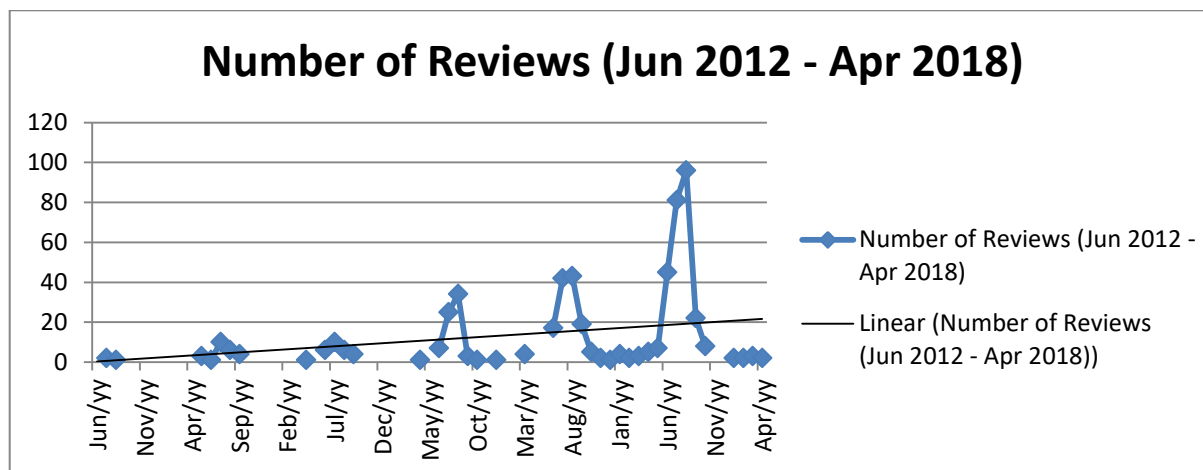


Figure 2. Growing number of reviews (Source: own work)

When we are looking for an apartment or room, other information also is available on the website: price, description about the accommodation, attributes of the property, special terms and conditions, information about the host - when he or she joined to Airbnb, description about himself/herself (optional), response rate and time, spoken languages and the written feedbacks. These points also help to the guest find a perfect place to stay.

One of the main purposes of this research is to examine the review system at Lake Balaton. In this section some cases (written review) are collected to demonstrate the different guest and host experience and give examples for the two-sided feedback system:

- The guest can highly appreciate if they receive nice unexpected surprise from the guest: *'Amazing view, comfortable and spacey house, fruit and nut trees in the garden, friendly hosting'* (guest).
- The reaction to a negative review can be different; a guest was unhappy, he said some improvement areas, the host reaction was pretty nice (*'Thanks for the comments, I try to improve the mentioned points, I hope you enjoy your stay next time'* - host). Or host can be upset by negative feedback (Guest: *'the flat was very dirty... The flat has used furniture and the kitchen sink is broken. The only pro rating is that we had clean sheets. We will not come here again!'* Answer from host: *'I find your review very unfair, and I consider it as revenge because I asked compensation from you for leaving an extreme smoking smell in the flat, which was against our policy.... you arrived before the standard check in time, we tried to do everything to please you and to hand you the flat as soon as possible. We are sorry if the flat was not clean enough for you, we will improve that in the future.'*)
- In other case the guest was happy but he gave three stars: *'The host was really flexible, helpful, and responsive and we could reach him easily. Everything was good, we recommend this accommodation'* (guest)
- There are some exceptional cases: Guest: *'Pal is a great host. He lets you feel really welcome. He has cooked an amazing dinner for us on arrival with the porcini*

mushrooms, he gathered himself in the forest. He gave us a small tour of Balatonfüred, which was very interesting... One point of attention - the wifi is not working very well. You can check your e-mail, but can't watch a film on youtube... Pal is a very warm person; he will let you feel at home. I can certainly recommend this place!' Response from the host: 'Dear Anna thank you for your kind words. They help me to follow this way in the future during my host activities. I especially thank you for your critics on my wi-fi connections. I am going to ameliorate the problem. I hope next time you will be here (hopefully much sooner) this problem will not exist anymore. Paul'

Conclusion

This research is a study about accommodation sharing at Lake Balaton. The main purpose is to have a descriptive database for a selected period and to find data regarding the accommodation sharing. The review system is fundamental part of the online marketplace and it gives help to researchers to conduct examinations based on the online data. It can be concluded that the popularity of accommodation sharing is growing, more and more people advertise his rooms/apartment at online marketplace. Not only the ratings but also other, softer elements (written feedbacks) can help to the future guests make their decision, which accommodation should be selected. Some selected cases were mentioned where we could see the communication between hosts and guest and it also can help to choose a room for the guest and help to the host to accept or reject the query from the guest. This is a descriptive analysis that based on historical data. The author is planning to collect dynamic information as well and find correlation between the non-visible background data.

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Georgina Görög is a PhD candidate at Kaposvár University, Faculty of Economic Science, Doctoral School in Management and Organizational Sciences. Her research area is sharing economy and sustainable business models. Her interest area is the reliability of review system in the online marketplaces. She has publications on the field of sustainable consumption and corporate social responsibility too.

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Limitations in studies on technical efficiency of innovations

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Abstract

This paper explores limitations in studies of technical efficiency of innovations at the country level. Constraints existing in the current research methodologies are discussed. Such drawbacks may serve as a warning signal for reporting study result. Several problems of investigation technical efficiency of innovations are identified. These may serve as a guidance to formulate research questions and hypotheses for verification in further studies.

Keywords: innovation, technical efficiency, research questions

Main Conference Topic: Management: Technology and innovation management

Introduction

Innovations are considered key elements in a country's economic prosperity and employment rates. Not surprisingly, they are of pivotal interest to governments, entrepreneurs, executives, and academics. Notions such as innovation, creativity, competitiveness, accompanied by global political change and technological progress, and productivity have gained special attention. They became synonyms of economic progress. Making references publications on these subjects will produce a long list, planted with redundancies, and will be incomplete. Despite proliferating rate of studies on technical efficiency of innovations there are several constraints that frequently are not recognized, yielding results that have constrained practical value. This paper is based on the review of the subject related literature. It, presents some of such limitations that both researchers and those to use study results should be aware of. Some prepositions worth further examination are outlined. No classical outline based on hypotheses testing and reporting results is adopted.

Definitions

The concept of innovations and innovativeness is controversial. Definitions as to what is innovation are not clear. What exactly constitutes an innovation, or how an innovation is defined, is not universally agreed upon (Nasierowski & Arcelus, 2012), (INNO, 2017). Oslo Manual (OM, 2005) definition of innovation became a standard, and a precondition of discussion on the subject in Europe. There are however problems with operationalization of this concept. It is probably impossible for an independent researcher to provide a definition of innovation, predisposed for operationalization, that will be widely accepted. Consequently, the definition of innovation often used is an *indicatum* type since it is included in the description of the discussed object. It is a terminological, not an empirical definition (Nowak, 1965, pp.245-281).

Innovations vs Inventions

The notions of innovation is different to invention as explained by Oslo Manual and Frascati Manual. When "thesaurus" is referred to these are synonyms. There are also pivotal differences between technical efficiency and allocative efficiency. Such distinctions are often overlooked, especially in publications and presentations that to not have scientific and/or business background or aim. Such deficiency in precisions, if overlooked may easily lead misinterpretation of results, at minimum to confusions.

Furthermore, at times reports, and even composite indexes that have a word - innovation - in their title, use data mostly related to inventiveness (variety of R&D counts, patents), and not data directly related to innovations or innovativeness. Even the use of counts related to doctoral degrees may be misleading. Solutions used of the rice fields in Vietnam or Indonesia are breathtaking: probably these have been developed by people without formal schooling. Smashing financial and prestigious successes are at times achieved by entrepreneurs without university degrees - B.Gates and Microsoft, S.Jobs and Apple. Therefore, the use of educational attainments alone to indicate levels of innovativeness may be regarded incomplete. Though difficult to grasp, some data series related to levels of creativity, innovative drive in the society, conditions that allow a free-mind should be entered into discussion.

Measuring innovations

Suggestions as to how to measure and collect data about innovativeness have been presented, for example: (Borras & Edquist, 2016), (Gault, 2013), (OECD, 2010), (OECD, 2008), (Langdon, 2008), (Arundel & Hollanders, 2005). The "easily" accessible data about innovations can be found for example in rankings of countries that allow the development of composite indexes of innovations. Frequently used sources include: (European Innovation Scoreboard (EIS), 2017), (World Competitiveness Report, 2017), (Global Competitiveness Report, 2017), (Global Innovation Index, 2014), (Human Development Index, 2014), (Knowledge Assessment Methodology, 2014) to name only a few. These scales are not free of drawbacks, but they have been recognized as options used within the field. Data series are at times flawed with critical errors. In some instances systems responsible for data collection can be questioned, as observed with respect to WCY and gathering of data in Poland. On other occasions, as noticed in EIS, when new data series are entered to the index, some countries, Cyprus, Malta, Turkey for example, report values for data that are far away from observable patterns, which is difficult to explain.

Methodology: the use of composite indexes vs non-parametric approaches (Data Envelopment Analysis for example)

Data Envelopment Analysis (DEA) and composite indexes are frequently used to investigate technical efficiency of innovations. Both have advantages and disadvantages, supporters and adversaries. It is probably a topic for a purely academic discussion, that does not lead to commercial type results, which method is better. These methods deal with the different perspective to examination of the subject, and may serve different purposes.

Rankings by composite indexes can be interpreted as a proxy of results of assessment of technical efficiency of innovations with the use of DEA. Development of these indexes has powerful and wealthy sponsors such as the World Bank, European Union Commission,

United Nations Development Programme, INSEAD, IMD to name only a few. Composite indexes algorithm command the forefront of attention. Publications and discussions, whether lauding their merits or panning shortcomings of such indexes is abundant (eg. (Fagenberg, 1994), (Freudenberg, 2003), (Grupp & Schubert, 2010), (Adam, 2014). These indexes contribute to explanation how countries are evaluated and ranked, often for public relations purposes. Similar data-series and methodology are utilized to rank countries' dedication to wealth, standard of living, expenditures for education or R&D, and longevity and quality of life, and produce statistically similar findings (Nasierowski, 2016).

Technical efficiency of innovations denotes how effectually a country transforms inputs into results. Innovation efficiency can be measured as the ability of firms and agencies in countries to translate inputs into outputs profitably. A country may produce many important innovations, but may not meaningfully implement them into products or services, or it may dedicate excessive resources to achieve insufficient outcomes. Yet, the assumption behind composite indexes formulation is that some metrics of innovativeness are created on the basis of data-series. Then, each component enters the index with the same weight of importance for all countries. This implies that the process of computation of the index of innovativeness includes the belief that all countries are equally efficient in transforming inputs into outputs. However, it is possible for countries to utilize varying amounts of resources to produce an equivalent amounts of outputs, without the difference being reflected on the index of innovativeness. This leads to the important issue of how to assess the Technical Efficiency of Innovations (EFF) of countries.

Innovation in the context of the economy and objectives of a study

It is warranted to underline that it is probably impossible and for sure very difficult, to isolate the impact of innovations from other market, political, social, economic developments upon economic growth. Despite this quandary, it is important to be aware of consequences of values of various indicators related innovativeness. The examination of these indicators may form a useful platform for a discussion about innovativeness efforts, and for formulation of strategies and policies relevant to technological betterment. It is assumed that creating of such policies may contribute to the economic progress, and improvement of competitiveness. This can be achieved however, only if specificity of data allows such policy considerations.

It is worth remembering that outcomes of any study on technical efficiency of innovations may also depend upon the objectives of the study. There are distinctions between academic type approaches vs business like benefits vs policy making focus, and will call for a development of the topic related methodology. Entrepreneurs know how to change ideas into gains and do it. Politicians and governmental officials shape the climate (through policies, rules, priorities), provide means, and at times resources, to solve problems and contribute to economic betterment.

Furthermore, when composite sources are used the differentiation between technical and allocative efficiency may not be an issue. The use of DEA forces a precision in formulating study objectives. These objectives may call for specific data series that almost certainly will not be available for a broader number of Decision Making Units (countries for example), making comparisons between countries not possible. Therefore, the use of DEA may not be feasible. This will also prevent the use of simulation to identify areas that call for special attention and arrive at findings that offer ready-to-be-used suggestions for improvement (also because of aggregate format of the data available).

Grouping of data pertinent to innovations

Grouping variables for the purpose of the assessment of technical efficiency, as presented in the EIS for example, is “name of data series driven”. In an unreported report the factor analysis with Oblimin rotation was used to identify such groups. Elements (data series) with values lower than 0.5 in the Anti-Image Correlation Matrix were eliminated. Standardized values of data $[(x-x_{\min})/(x_{\max}-x_{\min})]$, suggested in the EIS (2017, Chapter 6), were used, and any value greater than 1 (along with the examination of scree plots) was set as the benchmark to identify the acceptable number of factors. This approach has not produced convincing results, yet results provide some guidance to group data into inputs and outputs.

The identification of groups of inputs may be akin to the specification of NIS subsystems. Such subsystems have been named by several authors as reported by (Nasierowski, 2009). These are:

- governance of NIS; i.e. crafting policies, regulations and priorities that supports innovation, accompanied by assumptions regarding innovation underpinnings within the economy of a country, and the society;
- funding of research, commercialization of results, and regulations that foster transfer of technologies to practice;
- improving the quality of human capital (labeled frequently as education), that tailor education systems to produce graduates with entrepreneurial, creative skills;
- direct and indirect support for innovations via SMEs, as well as accounting and legal practices that stimulate innovation to flourish.

These subsystems (groups of variables) are consistent with the Lisbon Strategy (2000), endorsed as a guide to scientific development within the European Union. Identification of data series to describe such subsystems for a number of countries cannot be done with respect to aspects of governance. In this area isolation of issues important is country specific, and depends upon individual economic, social, and cultural characteristics.

For inputs, grouping of data is reasonably simple task, and is impacted by results intended to be arrive at. Inputs reflect means to achieve objectives, yet there may be a variety of objectives that are reflected by different outputs, different data series, and attention to different NIS solutions. Innovations are undertaken means to accomplish these objectives, but there is a broad scope of outcomes that may be desired. Metrics to describe outputs and the selection of the NIS subsystems may depend upon each country’s specific policies of economic development, the corresponding priorities, and expected gains from innovations. Different sets of outputs and metrics will reflect the desires of governments and their plans. These may be among the reasons for problems with identification of outputs experienced by EIS, as evidenced by frequent changes to data that denote outputs between 2005 and 2017. The set of 5 outcomes, as used by EIS (2017), may not reflect the diversity of objectives, nor the diverse range of countries examined in this study.

Aspects that impact on technical efficiency and the issue of "enablers"

Exploring the merits of introducing the concept of "enablers" - data about some existing and difficult to change characteristics of the country - to the examination of technical efficiency of innovations is important but not practiced. Inclusion of enablers to examination of technical efficiency does not cause results of DEA to be different to results presented by EIS in terms of ranking countries. However, the use of composite of indexes of innovative-

ness simply states a fact according to the data used: the use of DEA facilitates examination of various questions associated with questions why results are as they are. Answers to these questions will assist in identifying research questions enhancing further studies and understanding of the subject.

There is a need to clarify the set of data related to enablers. First, which aspects indeed impact on technical efficiency of innovations and to which extend (which are the most important), and second, which data are, or may become available, or can be used as a proxy of data that are needed. The incorporation of enablers (moderators) measures into the study, that marks a relatively new view, and therefore disputable element, calls for more data that are not available at this point in time. Also, it may be worth further examination whether "enablers" can form a separate input, or considered as an element that "moderates" input-output relationship. If the later is accepted then the use of Structural Equation Modeling may be appropriate. Results of the adoption of such an approach may clarify this concern, and can form yet another research topic. However, in light of other constraints of studies on technical efficiency of innovations - availability of reliable data related to specific issues - the effort may not be worth achieved results.

Outliers

Question of outliers in the context of studies that use comparisons between countries makes an interesting topic. The answer to related questions may lead to a discussion on the selection of countries that are somewhat similar (because of size, wealth), or have strong business ties. Within studies on technical efficiency size, wealth, experience may be irrelevant to the assessment of efficiency. There is no a convincing argument whether "big" or "small" countries should be removed, and which criterion can be decisive to do so. It may be questioned whether China and Iceland, for example, could be compared in a single study under the assumption that the size may be associated with benefits stemming from organizational synergies. A related issue can be traced to comparisons of different provinces in Canada or Germany or provinces in China as reported in some composite indexes. Again, there is "something" - maybe location or traditions - that impacts decisively or stimulates enhanced technical efficiency.

Aggregate data

Available data series are at a high level of aggregation yielding pin-pointing suggestions as to what should be improved impossible. For example, the use of doctoral degrees counts is used as a measure of a level of innovation capacity. However, normally doctoral degrees in music or political sciences have different impact upon innovations than doctoral degrees in biology or electronics. All such degrees may shed light on innovativeness of the society, but not on propensity of commercial application of novelties. This situation leads to the situation when suggestions arrived at are very general. Should detailed data become available results of simulation experiments may highlight means and areas that may call for special attention in an attempt to improve technical efficiency of innovations.

Distinguishing inputs from outputs

It is worth mentioning that an unequivocal differentiation between inputs and outputs is prone to create controversies: here what is an input and what is an output. For example, employment in R&D may be an output, a consequence of investment in R&D, and concurrently an input in terms of creation of commercial outputs. This quandary should be given special attention when determining objectives of the study.

Time slack

There is an essential question of time slack related to innovations. Normally, current efforts do not contribute to current results. At the company level such slack can be in some instances documented. Caballero (2014) has investigated the slack between R&D personnel as an input, and total number of patents and registered trademarks, and observed a two year delay. Generally, investigating time slacks at a country level may be a fruitless effort.

An example of quandaries related to education

Similar problems deal with education - which specific courses and with the use of which teaching methods have the greatest impact upon development of innovative/creative attitudes. Mathematics, physics, biology, chemistry, logics in pre-university education may be assumed to be among disciplines that contribute to enhanced desires and skills in innovativeness. Knowledge and appreciation of these disciplines form the foundation that assists future inventors, innovators, and entrepreneurs. However, it is more a hypothesis than a scientifically and practically evidenced conclusion. Furthermore, in some composite indexes, EIS for example, counts of foreign students and graduates are used. To be remembered the choice of overseas location for studies depends upon many criteria used by students and the assessment of attractiveness of the locations. This aspect further justifies incorporating "enablers" to the set variables used in studies on technical efficiency.

Congestion related controversies

When using DEA to investigate technical efficiency, the technical efficiency (EFF) is examined as a function of Return to Scale (RS), Congestion (CON), and Pure Technical Efficiency (PTE) - $EFF = RS * CON * PTE$. A more precise interpretation of RS and CON in the context of innovations is still missing. For example, reasons for congestion in pro-innovation efforts and its interpretation is not clear or easy to explain. It would be worthwhile to determine to which extend over-investment, deficient organizational solutions, and the like, contribute to congestion. Further to this concern, it is worth mentioning that at times solutions considered standard in one country, may be regarded as luxury in another, or an unnecessary waste in another. Such interpretations may be sought in the level of wealth, tradition, accepted cultural and legal norms. The explanation to related questions may be sought with incorporating "enablers" to the study and a drive to use less aggregate data, yet may result in results focused on a narrowly defined segments of economy, or questions related to very specific aspects of innovativeness.

Cross-relationships

There may be cross-relationships among data-series used. The use of correlation coefficients to eliminate redundant data series as used in the current study may not be enough. The issue may be that "a" impacts on "b" directly, yet also indirectly on "b" via "c". Again, keeping in mind other limitation of the study (data series used, their reliability, aggregate format) resolving quandaries in this area may remain a purely theoretical concept without promises to yield practical gains worth effort;

Conclusion

The presented areas of problems and limitations of studies on technical effectiveness of innovations pose valid question regarding usefulness and credibility of presented results. Indeed there are problems and limitations difficult to resolve, and several hypotheses worth verification before attempts of formulating comprehensive programs are undertaken. However, even with the current limitations further efforts in investigation of technical efficiency of innovations are worth continuation since they broaden understanding of the complexity and the importance of the subject. The case may be to remember about existing constraints and drawbacks

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Biography

Wojciech Nasierowski's (Ph.D., D.Sc.) research interests have focused on innovation (eg. Project Development), formulation and evaluation of strategic plans and innovation related projects, restructuring of companies. He has published some 200 papers and nine books on related topics. Over the last twenty years he has taught university type courses, provided workshops and seminars at all levels of instruction in more than 20 countries on topics related to Competitive Strategy, Organization Design, International Business, and Innovation Management

Circular Economy in a Multiple Helix Perspective: A Review

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Abstract

The Multiple Helix may be defined as a general framework to explore complex innovation dynamics amongst the main actors such as governance, academia, industry and society. Considering that the Multiple Helix approach adds to the traditional Triple Helix framework the influence of society in its multiple intervening roles, a wider and broader discussion is needed to fully comprehend the resulting dynamics in such complex ecosystems. As currently innovation cannot be discussed without considering sustainability aspects and goals, multiple combinations of knowledge and resources have to be addressed in an attempt to harmonize the ambitions of both environmental conservation and economic growth. To this end, current study aims at reviewing and discussing the Circular Economy fundamentals based on a Multiple Helix framework, as it is considered key that the relationship between industry and environment is crucial for industrial business performance. The body of knowledge that is created here is meant to support mainly students and practitioners, but also new researchers, which are addressing the problematic of Circular Economy in a Multiple Helix Perspective.

Keywords: Circular Economy, Sustainable Strategy, Closed Loop Systems, Multiple Helix

Main Conference Topic: Technology and innovation management

Introduction

In a Multiple Helix system, interactions amongst the different actors evolve from the traditional Triple-Helix university–industry–government relations to a wider approach, where society, with its different roles and contributions, is considered (Carayannis, Sindakis, & Walter, 2015). Thus, a wider approach is considered and societal perspectives are considered, whether as mere consumers that purchase the good manufactured by the companies, to a more active role, acting as global regulators of all aspects related to the multiple Helix framework interactions. One model of these interactions is synthesized on a conceptual framework presented by the authors (Julião, Gaspar, & Tjahjono, 2016). This interaction model was derived in order to identify and schematically display the main interrelations, and consequent multi-level flows amongst all actors of such ecosystem towards attaining the sustainable development goals.

Circular Economy (CE) attempts to harmonize the ambitions of both environmental conservation and economic growth, considering multiple perspectives, *i.e.* levels of analyses and life cycle phases. CE can be applied to an economy, sector, or individual process, and comprising the environmental impact of the entire activity system, *e.g.* production, design, transportation, distribution, consumption, recycling, and disposal.

Although the term of *Circular Economy* is clearly conceptualized, there is not a CE definition that could be said that is communally accepted. Actually, one of the weaknesses of CE is the lack of a comprehensive and formal definition (Kobza & Schuster, 2016). For example, there are definitions that focus on the economic aspects (e.g. Stahel & Reday-Mulvey, 1981), the 3R principles (e.g. Yuan, Bi, & Moriguichi, 2006), and others the industrial ecology (e.g. Geng & Doberstein, 2008).

Based on an extensive review and case studies analysis, the Ellen MacArthur Foundation proposes a more comprehensive definition that considers both the environmental and economic advantages simultaneously. According to the underlying foundation, CE is defined as “an industrial system that is restorative or regenerative by intention and design” (MacArthur, 2013). This underlying concept will sustain the arguments presented on this paper, as the authors will analyze the CE principles in a Multiple Helix System approach with the underlying principle that the relationship between industry and environment is crucial for industrial business performance. The body of knowledge that is created here is meant to support mainly students and practitioners, but also new researchers, which are addressing the problematic of Circular Economy in a Multiple Helix Perspective.

Academia and Governments as precursors of Circular Economy

Circular Economy can be applied to a wide range of product types, such as everyday consumer goods (MacArthur, 2013), all types of services, or other types of manufactured products. In this review it is assumed that CE is primarily concerned with material goods, *i.e.* manufactured goods that are available on the market. Consequently, the service sector will not be addressed, considering that it does not convert materials into goods, and so, it is less affected by the circular principles.

In response to the challenges of resource scarcity and environmental impact, both governments and academia are the main promoters for the public awareness, making them major precursors of CE. From their extensive review, Lieder & Rashid (2016) concluded that the acceptance of CE concept and its implementation desire is growing. According to Giutini & Gaudette (2003), CE has caught the attention of governments, researchers, and NGOs as a plausible road towards sustainability. However, this desire needs to be materialized, *i.e.* implemented by manufacturing companies.

One might argue that a transaction from a linear to a circular model may be perceived by industry as a constraint to the business process rather an opportunity for sustainable business and growth. Although this might be the case of most companies, there are exceptions. Companies like Michelin, Renault, Caterpillar and Ricoh have successfully applied the CE concept (MacArthur, 2013).

According to MacArthur (2014), companies that have adopted CE principles reportedly benefits, mainly from material savings, reduced supply risks, improved customer loyalty and the development of new revenue streams. Thus, the dimension economic benefits, or competitive advantages, needs to be added to the resource scarcity and environmental impact perspective (Lieder & Rashid, 2016).

Moreover, business competitiveness depends on the commercial success of products in the marketplace, which relies on the consumer's acceptance. Thus, consumer awareness of

CE issues is another element to be considered when addressing CE implementation. These arguments sustain that the relationship between industry and environment is crucial for industrial business performance.

Companies and their lead-role in the Circular Economy model

Companies, particularly manufacturing enterprises, play a key role in CE since they are responsible for the creation and manufacturing of products. Although the traditional linear economic model appears to prevail in most companies, some are currently leaving the model based on throughput optimization and cost efficiency and starting to implement strategies that integrate sustainability issues (MacArthur, 2013).

In this context, the challenge is put into the identification of drivers and arguments that impel the remaining companies towards CE and circular innovations, particularly, to adopt cleaner production solutions and eco-design principles. While cleaner production looks at the pollution, energy and efficient use of resources in the transformation processes, eco-design aims the incorporation of environmental issues into the design of product and processes. Mainly driven by public awareness (Horbach, 2008) and regulations (Dangelico & Pujari, 2010), companies are increasing their efforts to integrate environmental sustainability issues into their products.

One of the key principles of CE states that to manufactured durable products (or parts) they need to be designed from start for reuse, *i.e.* designed in a way that optimizes disassembly and reuse.

Another important argument that may drive companies towards circular products was raised by MacArthur (2013) and is related to the end-price of the products and the volatility of the markets, as they have been growing significantly in the recent past, mainly due to the population growth and the scarcity of raw materials. The underlying argument is that if companies manage to create products that are less (raw) materials dependent and have a high percentage of reused materials, they will be less exposed to resources price and volatility, giving a competitive advantage to the manufacturing companies.

It is important to stress that the reduction and reuse of raw materials cannot compromise the quality of the product since consumers will not accept it (Khosla & Taghian, 2005). Also, the reuse of resources implies the implementation of a policy that promotes the return to the company of products. Moreover, products are to be designed in a way that disassembly is facilitated and resources recycling is efficient.

Considering only the economic perspective, in some market economies, the prices of materials and natural resources are too low, which may inhibit the applications of some CE principle (Andersen, 2007). However, company managers need to realize that this might be the case in a short term. In a long term, the depletion of resources and environment costs will change the cost-benefit balance. Thus, companies may gain strategic competitiveness by being pioneers in adopting CE principles.

By applying the reduction principle of CE to product design, companies may benefit from minimizing the input of raw materials. The gain in raw material savings may come from reducing the bill of materials, standardization, and modulation of components, simplified products and packaging, among others. If the reuse principle is introduced at the design

phase, companies can also significantly reduce the need for raw materials (Castellani et al. 2015). Designing products balancing the economic, environmental and social dimensions, companies can contribute to both economic growth and sustainability.

Product manufacturing implies the input of energy (*e.g.* oil, gas, coal) and in most cases, lead the emission of pollutants (*e.g.* solid waste, gas, water waste). Moreover, the energy cost for most processing industries is significant, ranging from 7% to 30% of total operating costs (Brodkorb et al. 2007). Thus, energy savings promoted by CE principles can contribute significantly to industrial profitability and long-term success, especially for energy intensive processes and economies that rely heavily on imported energy. For example, energy consumption per industry output value for the main industry sectors in China has reduced 0.75 billion tons of standard coal in five years (Wu et al. 2014).

Companies may also expect direct benefits from reducing the emission of pollutants and waste. One example is the reduction of waste management investments, which push companies to have more efficient transformation processes that are focused on effective use of resources. Compiling with legislation and regulation will also be facilitated.

It can be argued that is impossible to have a manufacturing system that is fully circular, where both products and energy are completely reintegrated in the system in a continuous way. For example, considering the reuse and recycle of materials, only a few are fitted to consecutive recycling cycles with minimal waste (*e.g.* glass, metal), and many can only support a few cycles because become environmental and economically too expensive.

The inclusion of sustainable issues in the corporate strategy can be perceived by companies either as limiting their *modus operandi* or as an opportunity to reduce operational costs. Competitive pressure push manufacturing companies to primarily focus on economic benefits and growth, which blurs their vision. The CE-initiatives are seen as constraints to industrial activities rather an opportunity for sustainable business and growth. Although, it has been confirmed by different researchers that there is a direct correlation between the integration of environmentally sustainable solutions and the gain of competitive advantage (Chen et al. 2006; Doran & Ryan, 2014; Ellram et al. 2008; Lin et al. 2013; Saxena & Khandelwal, 2012; Wong, 2012).

According to Porter and van der Linde (1995) reducing environmental impact at lower costs could be perceived as an opportunity by companies, mainly by redesigning products, processes, and/or operation methods. As such, the relationship between industry and environment is critical for industrial business performance (Lieder & Rashid, 2016). This allows one to conclude that although CE may present different challenges and opportunities to companies, it can have an overall positive impact on their business. The challenge for manufacturing companies is to adopt the business models that aim to profit from existing resources and reduce new resources dependency. Thus, economic factors, such as cost reduction, may be seen as important drivers for companies to adopt CE principles.

Consumers as the target of Circular Economy

The commercial success of products that integrate CE principles, circular products, in the marketplace is crucial in driving companies and society towards environmental sustainability (Hall and Clark, 2003). However, the majority of consumers may still relatively unaware of CE concept and principles. Nevertheless, due to regulations, scientific

publications and public discussions, the awareness of sustainable issues has been increasing. As a result, the demand for circular products shows signs of increasing, but according to Mintel report (Mintel Group, 2009), only a few consumers consider sustainability factors in major purchases.

Many conceptualizations of the CE seem to exclude large parts of the social dimension (Geissdoerfer et al, 2017), in particular consumers. Nonetheless, consumers may have a great contribution to the implementation of CE principles, since they are the ones purchasing products and influencing governments. Consumers tend to select products based on the perceived value for money according to its price and quality ratio (Mandese, 1991). As discussed by Witjes & Lozano (2016) quality criteria may include other non-pecuniary criteria (Parikka-Alhola, 2008), as environment criteria (Rietbergen & Blok, 2013). But this value needs to be communicated to consumers in an efficient way.

In general, miscommunicated and not environmental concerned consumers are typically reluctant to search for information (Gleim et al. 2013; Zhao et al. 2014) and view circular products as less effective than conventional products (Lin and Chang 2012). On the other hand, consumers that demonstrate sustainability concerns seem to be satisfied with their quality (Ritter et al. 2014). Thus, increasing sustainability consumer awareness may have a direct effect on the development of circular products.

It has been also argued that developing products which excels in environmental terms while remaining economically and technically competitive, is a significant challenge (Pujari, 2006), as in most instances it implies making trade-offs. Considering a business perspective, it seems to prevail the idea that producing circular products increases costs and affects efficiency, which needs to be reflected in higher prices. From the consumer point of view, circular products need to demonstrate at least a comparable quality to the conventional products (Lin et al. 2013), since the perceived quality directly affects the intent to purchase (Tseng and Hung, 2013).

Consumers that are more sensitive to sustainable issues tend to accept more easily higher prices of circular products (Laroche et al. 2001), but the higher prices must be related to the benefits that consumers will gain when using or consume these products (Tomasin et al. 2013). On the other hand, consumer that are not aware of sustainability issues, are unwilling to pay a premium price for circular products offering the same quality as conventional products, because price sensitivity is related to the perception of value added and this value is often only evident in the long-term (Drozdzenko et al. 2011). Thus, increasing sustainability consumer awareness may also increase circular products demand, driving new business models and a manufacturing shift from convention to circular products.

Although consumers have information about environmental advantages of CE and gains associated with well-being and health, have little knowledge and experience with products that integrate CE principles, which increases their doubts regarding their specifications, claims and added value, and reduces purchase intention. Therefore, product information needs to be efficiently transmitted to consumers.

Environmental labeling is an effective way of communicating to customers the specific benefits and characteristics of the product and the claim, which can be displayed by using symbols or messages (D'Souza et al. 2006). For example, consumers tend to value products with certificate information more highly, like a seal of quality, since they are willing to pay

more for these products (Cason and Gangadharan, 2002). Thus, the acceptance of circular products by consumers may be enhanced if sustainability claims are communicated efficiently, which will promote the manufacturing of products that integrate CE.

Environmental regulations will also help consumers perceiving the benefits of the environmental advantages of CE. However, it is pivotal that governments introduce correctly designed environmental regulations, which have a critical impact in encouraging the adoption, creation and diffusion of green innovation and green product development. Nevertheless, the complexity of both regulations and innovation processes makes the relationship between them complex, and it is not yet fully understood. Moreover, their impact will depend on the design instruments, stringency of the regulations and the context in which they are applied, particularly the type of company. Environmental innovation will certainly contribute to the sustainability of societies. For this to occur, there is a need for systematically improved environmental regulation, as well as environmentally motivated innovation policy (Leitner, Wehrmeyer, & France, 2010).

Conclusion

Considering a Multiple Helix approach, the Circular Economy fundamentals were reviewed and discussed in a framework envisaging an effective relationship between industry and environment to promote sustainability. The body of knowledge created is meant to support students, practitioners and researchers, which are addressing the problematic of Circular Economy in a Multiple Helix Perspective.

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Gas Pressure Assessment on the Water Saturation Effect of Compacted Bentonite-Sand Layered Samples

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Abstract

Gas production is inevitable in deep solid wastes due to various mechanisms such as organic material disintegration and water radiolysis. The resulting gas may potentially affect the sealing properties of bentonite fills according to gas and underground effects. There is a competition between water and gas: one to seal the inflatable bentonite and the other to try to feed the bentonite buffer. Thus, this study focuses on the numerical modeling of the compression of bentonite-sand specimens according to the effects of water and gas on saturation and sealing.

Different gas pressures (0, 2, 4, 6 and, 8 MPa) were applied to the upper surface of the finite element model. The results show that the bentonite sand samples have saturation pressure up to 2 MPa. As the gas pressure increased, this effect became even more pronounced. When the gas pressure was 6 MPa or higher it was difficult for the upper sample to be completely saturated. This gas played an important role in the water saturation process and the bentonite based fill materials affected the sealing effectiveness.

Keywords: Bentonite mixture, finite element model, gas pressure, waste management

Main Conference Topic: Civil Engineering

Introduction

The management of solid waste is one of the most important tasks for urban countries. Currently, deep geological disposal methods with engineered geological barrier (EBG) are frequently utilized by most countries. Various sub types are used as EBG: buffers and backfills, seals and plugs (Liu et al., 2017). Bentonite-sand mixture materials have been used by several countries as buffer and backfill materials (Liu et al., 2016). In most storage concepts, bentonite is only partially saturated and the bentonite barriers are invaded by groundwater after sealing of this storage causing bentonite swelling. Consequently, gases such as hydrogen, oxygen, methane, and carbon dioxide are produced in the long term (Birgersson et al., 2008).

In recent years, the sealing efficiency of engineered barriers was observed by researchers. With this purpose on mind, the gas permeability of samples under different (Chen et al., 2012; Liu et al., 2015) and constant confining pressures (Graham et al., 2012; Liu et al., 2016) are investigated. Therefore, numerical modeling is a good method to evaluate the degree of saturation. Additionally, the distribution of the degree of saturation in different portions of the sample may be observed for a more complex and efficient modeling.

Theoretical Modelling

The relationship between water saturation, S_w , and capillary pressure, P_c , definition is described by Van Genuchten (VG) model (Genuchten, 1980):

$$S_w = \left(1 + \left(\frac{P_c}{P_r} \right)^n \right)^{-m}$$

(1)

where $m = 1 - 1/n$ and P_r are the two parameters related to the pore size distribution of the porous material. Therefore, the relationship between water saturation and relative humidity could be determined by the Van Genuchten model and the Young-Laplace equation.

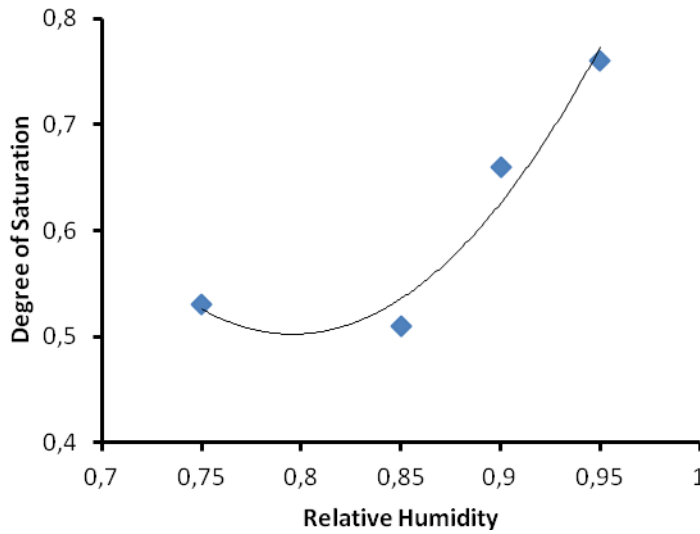


Fig. 1 Determination of the VG model parameters in the water retention test.

Relative permeability is given by the Mualem model (Mualem, 1976):

$$K_{w,r} = \sqrt{S_{l,j}} \left(\frac{\int_0^{S_{w,j}} \frac{dS_w}{P_c}}{\int_0^1 \frac{dS_w}{P_c}} \right)^2 \quad (2)$$

$$K_{g,r} = (1 - S_{w,j}^{1/2}) \left(\frac{\int_0^{S_{w,j}} \frac{dS_w}{P_c}}{\int_0^1 \frac{dS_w}{P_c}} \right)^2 \quad (3)$$

For all tests the temperature was kept at 21 ° C; For this reason, the temperature effect in simulation was ignored.

Simulation Model

A general model for thermo-mechanical calculations was established with nonlinear multiple physical modeling. The finite element method (FEM) has been applied for modeling using unsaturated porous media theory and mechanical, thermal, and hydraulic phenomena that are continuously studied. The mesh consisted of quadratic elements.

There are three types of boundary conditions for the axial symmetry model: a lower boundary, an upper boundary and a lateral boundary. The mechanical boundary conditions require that the sample is vertically displaced above and below the base and zero at the edge of the sample with zero radial displacement. Flow boundary conditions include the flow of water and gas. In particular, the lower limit is defined as the upper limit 4 MPa in direct contact with the gas in direct contact with water. The distribution of gas pressure and water pressure along the height is linear as shown in the laboratory tests. For simplicity, the gas and water pressures must be systematically high.

Results and Discussion

Fig.2 presents the general behavior of the water saturation as a function of time investigated in the sample. As shown in Fig.2, the water leach is gradually centered on the sample. In the experiment, when a water pressure of 4 MPa was applied to the lower specimen sample, the water flow penetrated the upper sample through the upper surface of the lower sample and the lateral and upper surfaces of the upper sample. This is caused by the initial gap between the sample and the pipe inner surface.

This phenomenon has also been observed in experimental study (Villar and Lloret, 2007). Significant water saturation was observed due to water invasion from the host rock. The simulation results for the bentonite-sand sample under 4 MPa, 6 MPa, and 8 MPa gas pressure for 150st day are shown in Fig.2

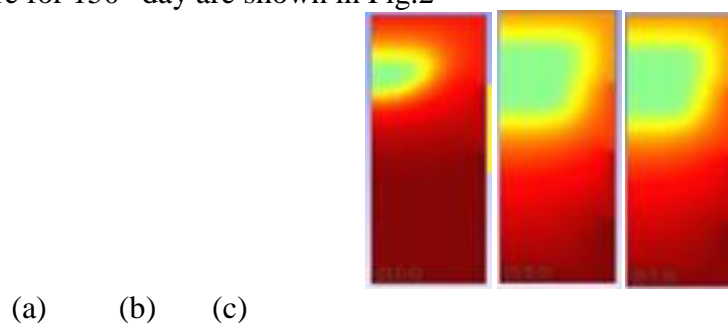


Fig. 2 Evolution of the water saturation degree of the bentonite-sand sample with time on the 150th day: under (a) 4 MPa, (b) 6 MPa, (c) 8 MPa

Conclusion

Experiments, both in the laboratory and on the in-situ, require long periods and substantial amounts of funding. For this reason, numerical simulations are useful tools to understand gas and water flow phenomena with partially saturated water bentonite-sand mixtures. First, during the saturation process, a pronounced water saturation gradient was observed between the nucleus and the surface of the sample. This gradient disappeared when the entire sample became fully saturated. When a gas pressure was applied, the binding effect

between water and gas pressures was observed. The water saturates the sample, but the gas has the opposite effect. The predominant role was determined by gas or water pressure acting on the pore structure of the bentonite sand sample.

When the gas pressure was at least 4 MPa, it was difficult for the water sample to penetrate the porous media. Thus, bentonite-sand mixture has strong effects on the unsaturation of the sample. The water saturation grades of the upper and lower samples decreased over time when the gas pressure was at least 6 MPa. This phenomenon is particularly important. The spaces between the box and the buffer and between the base and the buffer are potential locations for gas accumulation. If the gas pressure is high enough, both the buffer and the main buffer are affected. As a result, the entire barrier is seepage-proof and cannot be prevented.

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Thermal Analysis of an Organic Rankine Cycle Integrated Into a Combined Cycle

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Abstract

It has to be remembered that in the future the world will not have much more energy resources than today. That's why existing energy resources have to be used efficiently and smartly. Using combined or polygeneration cycles for electricity production are good examples for the energy saving methods. In this study a conceptual model which works according to the organic Rankine cycle principle has been developed. Developed model has been virtually integrated into combined cycle power plant operating in the industrial zone. Energy and exergy analysis of the proposed system have been carried out. The effect of operating parameters and the working fluid selection on the thermal efficiency have been simulated. The variable operating parameter is evaporator temperature and four organic fluids have been used in the analysis. According to the simulation results the best option among the fluids has been selected and stated.

Keywords: Waste heat, combined cycle, Organic Rankine cycle, thermal analysis,

Main Conference Topic: Engineering Science

Introduction

According to the energy studies, carried by the investigators, the global demand for energy will increase by around 30 percent until 2035 (BP Energy Outlook 2017 Edition, 2017). That rising energy demand leads to serious problems such as high greenhouse gas emissions, global warming and depletion of fossil fuels. For this reason, it is important to reduce greenhouse gas emissions and fossil fuel consumption by efficiently using energy resources.

Scientists and engineers have been highly motivated to develop the solutions for that problem. One of the methods that has been suggested is to integrate another power cycle into the existing power cycle. Thanks to the integration of new power cycles the thermal efficiency of the power system increases. There are several options namely organic Rankine cycle, Kalina cycle and Goswami cycle for that integration. Organic Rankine cycle is much more mature technology than the others. Experimental studies and on-site applications of the organic Rankine cycle can be found in the literature.

Vanslambrouck, Vankeirsbilck, van den Broek, Gusev and De Paepe (2012) made a thermal efficiency comparison between the steam and the organic Rankine cycles. In their study they found that organic Rankine cycle can work more efficiently with waste heat.

Karimi, Dutta, Kaushik, Bansal and Haque (2015) reviewed organic Rankine, Goswami and Kalina cycles as waste heat recovery options. According to their study every cycle has its own advantages and the choice of the right cycle highly depends on the waste heat temperature profile and the desired electrical power.

Peris, Navarro-Esbrí, Molés and Mota-Babiloni (2015) experimentally investigated an organic Rankine cycle and they compared the results of the experiment with the results obtained from the ceramic factory.

Sani, Behzadipour and Jalilnia (2015) simulated an organic Rankine cycle using solar power as a waste heat source. They analyzed different working fluids in their study.

Muhammad, Imran, Lee and Park (2015) presented a small scale organic Rankine cycle using the steam as a waste heat source. They selected R245fa as a working fluid and experimentally analyzed the cycle.

Tümen Özdil, Segmen and Tantekin (2015) made a thermodynamic analysis based on the industrial data. The selected working fluid for their study was R245fa. They found the exergy efficiency of the cycle as 47.2%.

Oluleye, Jobson, Smith and Perry (2016) evaluated the different waste heat recovery cycles for the industrial zones.

In the study of Koroglu and Sogut (2017) a simulation of an organic Rankine cycle for the maritime applications had concluded. In their study they made the exergy and the energy analysis for the different engine loads.

Javanshir and Sarunac (2017) compared wet and dry fluids used in organic Rankine cycle. They found out that the fluids with the high specific heat capacity have the higher power output.

In this paper a conceptual design of an organic Rankine cycle, which has been integrated into the existing combined cycle power plant, has been proposed. Energy and exergy analysis of the new cycle has been carried on with different working fluid alternatives by using the simulation methods.

System Description

In this study, the proposed system has two different part. One of them is the existing power plant and the other is conceptual organic Rankine cycle part. The existing power plant was opened in 1998 with a single gas turbine unit. Following various investments, the plant now has two gas turbine units and single steam turbine unit. In Table 1 the technical specification of the gas turbine is shown (GE Power, 2018).

Table 1: Technical specification of gas turbine

Turbine Type	Aeroderivative
Model	GE LM 6000 PC
Nominal power	50 MW
Inlet air cooling	Evaporative Cooling
Stage number of compressor	19
Stage number of turbine	7
Shaft speed	Compressor=10,000 rpm Turbine=3600 rpm
Compressor ratio	30.9

Fresh air taken from the outside enters the compressor where it is compressed and pressurized. Compressed air enters the combustion chamber where it undergoes a burning reaction with the natural gas. Following the combustion reaction the combustion gases enters the gas turbine. In the gas turbine electricity is produced. In the plant heat exchangers are used to recover the waste heat dissipated from the gas turbine. These heat exchangers called steam generators and they produce steam which is used in the steam turbine. The utilized

power of the whole plant is 117 MW and the schematic plan of the existing plant is shown in

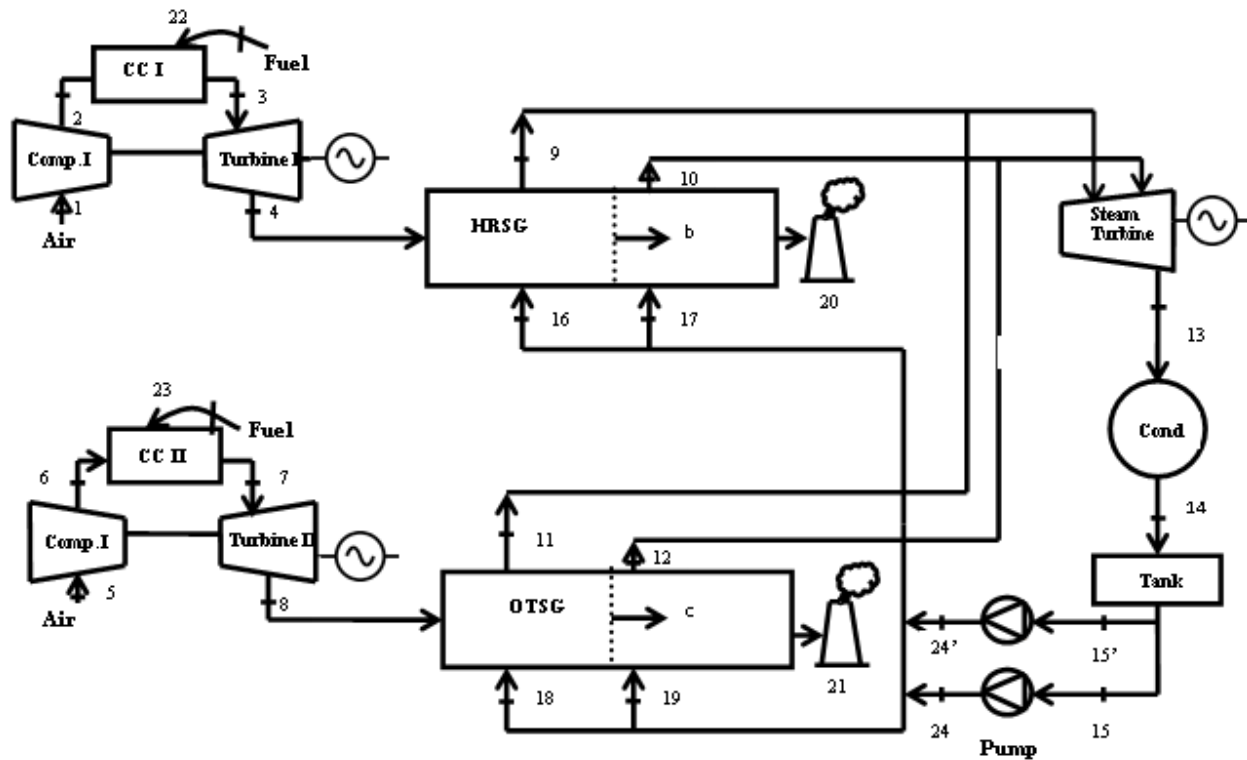


Figure 1 (Ersayın & Ozgener, 2015).

Figure 1: Overview of existing the power plant (Ersayın & Ozgener, 2015)

As Figure 1 shows, the existing power plant has two flue which dissipate flue gases with the temperature value of approximately 120 °C. In this paper a system design to recover the waste heat of these flue gases has been modelled. The main idea of the design is to integrate an organic Rankine power cycle (ORC) into the power plant cycle. Conceptual system consists of evaporator, turbine, pump and condenser. The working principle of the ORC is similar to the steam cycle. The difference between these two cycle is the working fluid. In the steam cycle water/steam is used while organic fluids are used in the ORC. Conceptual design of the ORC system is depicted in Figure 2.

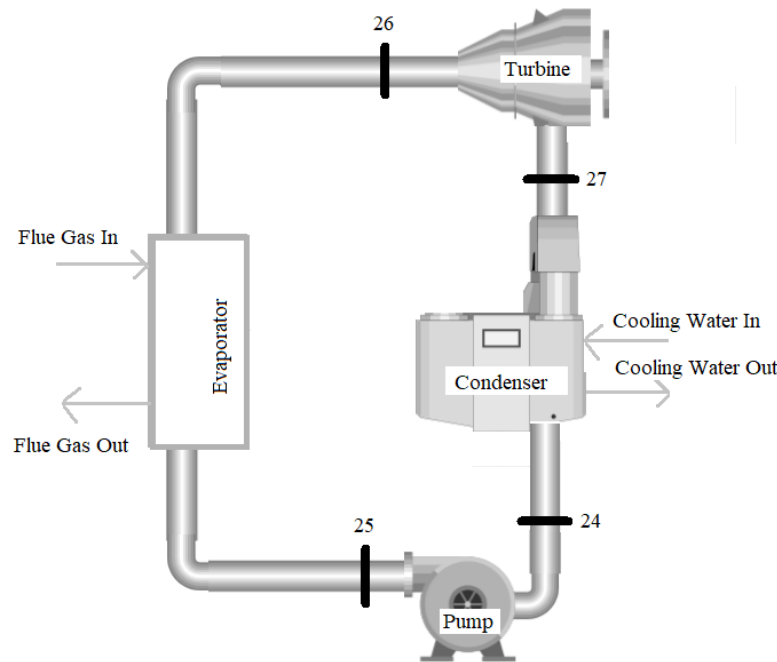


Figure 2: Schematic of Conceptual ORC

ORC has been chosen, because ORC can produce electricity from low and medium temperature (50-220 °C) heat sources (Oluleye et al., 2016). In the ORC, dry fluids can be used in the turbine unit without requiring to be heated reaching until superheated phase and it is a big advantage for energy efficiency (Vanslambrouck et al., 2012). On the other hand steam cycle uses water/steam as a working fluid and water is an example of wet fluid. In the steam cycle to avoid the turbine blades from the destructive effect of moisture, water is heated until reaching the superheated phase before entering the turbine process and this process requires great amount of energy. In Figure 3 T-s diagrams of the dry and wet fluids are shown.

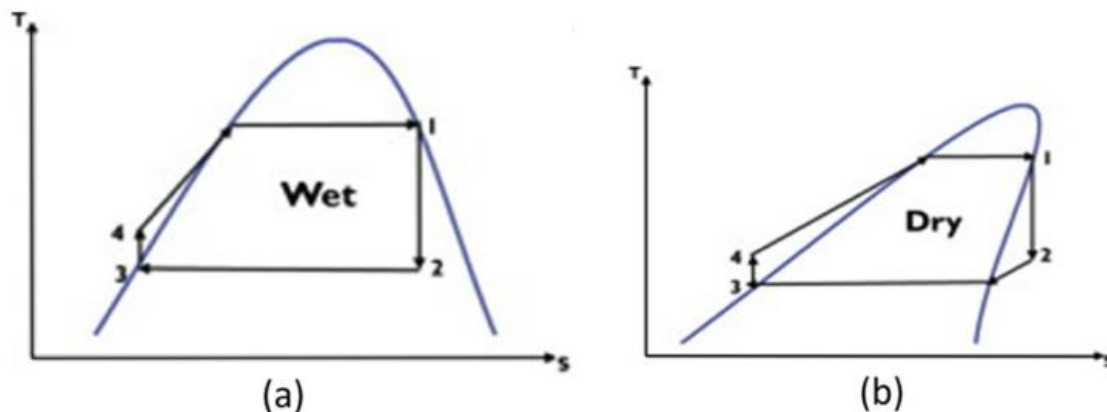


Figure 3: T-s diagram of the a) wet and b) dry fluids (Kwak et al.,2014)

As it is stated before, organic fluids are used in the ORC and choosing the right organic fluid has an important role on the efficiency of the system. Every organic fluid has different thermophysical characteristics and environmental effects. Low global warming potential and low ozone depletion potential is expected from the working fluids. In this study n-Hexane, n-Pentane, Isopentane and R113 are selected as working fluid options and their effects on system efficiency have been analyzed. The thermophysical characteristics of the selected fluids are shown in the Table 2.

Table 2: Thermophysical characteristics of the working fluids (Oluleye et al., 2016)

Working Fluid	T _{critical} (°C)	P _{critical} (MPa)	Boiling point (°C)
n-Hexane	234.7	3.03	68.7
n-Pentane	196.6	3.37	36.7
Isopentane	187.2	3.39	27.8
R113	241.1	3.39	47.6

Performance Analysis

In this paper exergy analysis of the conceptual ORC, which has integrated into the existing combined cycle, has been carried out using the actual operating data. The model assumptions are given below;

- The flow is steady state
- Combustion gases and air are assumed as ideal gas for the combined cycle.
- Dead state conditions for the pressure and temperature are 101.325 kPa and 298.15 K.
- Heat transfer between the plant equipment's and the environment is negligible.
- Saturated vapor leaves the evaporator of the ORC model.
- Saturated liquid with the condensing temperature of 30 °C leaves the condenser of the ORC model.
- Turbine and pump of the ORC model have the adiabatic efficiency of 75 %

Exergy can be defined as maximum useful work obtained from a system regarding dead state conditions. Exergy consists of four different constituents namely physical, chemical, kinetic and potential (Kotas,1985). In this study only physical and chemical exergy terms have been considered.

Physical exergy is the maximum potential of a given system at the initial conditions. Chemical exergy is related with the change of the chemical compositions (Kotas, 1985). The general exergy equations are given below;

$$\dot{E}_{x,heat} + \sum_i \dot{m}_i e_{x,i} = \sum_e \dot{m}_e e_{x,e} + \dot{E}_{x,w} + \dot{I}_{dest.} \quad (I)$$

$$\dot{E}_{x,heat} = (1 - \frac{T_o}{T_i}) \dot{Q}_i \quad (II)$$

$$\dot{E}_{x,w} = \dot{W} \quad (III)$$

$$e_x = e_{x,physical} + e_{x,chemical} \quad (IV)$$

$$e_{x,physical} = (h - h_o) - T_o(s - s_o) \quad (V)$$

$$e_{x,chemical,mixture} = \left[\sum_{i=1}^n x_i e_{x,chemical,i} + RT_o \sum_{i=1}^n x_i \ln(x_i) \right] \quad (VI)$$

Exergy value of each system point of the integrated ORC-combined cycle is calculated with the help of these equations. Exergy balance equations of the components of the system are shown in Table 3. Exergy destruction rates and exergy efficiencies of the components are also calculated.

Table 3: Exergy balance equations

Component Name	Exergy Balance Equation
Compressor	$\dot{E}_{x,1} + \dot{W}_{\text{comp}} = \dot{E}_{x,2} + \dot{I}_{\text{dest,comp}}$
Combustion Chamber	$\dot{E}_{x,2} + \dot{E}_{x,22} = \dot{E}_{x,3} + \dot{I}_{\text{dest,CC}}$
Gas Turbine	$\dot{E}_{x,3} = \dot{E}_{x,4} + \dot{W}_{\text{GT}} + \dot{I}_{\text{dest,GT}}$
Steam Generator	$\begin{aligned} \dot{E}_{x,4} + \dot{E}_{x,16} + \dot{E}_{x,17} \\ = \dot{E}_{x,9} + \dot{E}_{x,10} + \dot{E}_{x,20} \\ + \dot{I}_{\text{dest,HRSG}} \end{aligned}$
Steam Turbine	$\begin{aligned} \dot{E}_{x,9} + \dot{E}_{x,10} + \dot{E}_{x,11} + \dot{E}_{x,12} \\ = \dot{E}_{x,13} + \dot{W}_{\text{ST}} + \dot{I}_{\text{dest,ST}} \end{aligned}$
Evaporator (ORC)	$\dot{E}_{x,\text{fluegas,in}} - \dot{E}_{x,\text{fluegas,out}} = \dot{E}_{x,26} - \dot{E}_{x,22} + \dot{I}_{\text{dest,Evap}}$
Pump (ORC)	$\dot{W}_{\text{pump}} = \dot{E}_{x,25} - \dot{E}_{x,24} + \dot{I}_{\text{dest,Pump}}$
Condenser (ORC)	$\begin{aligned} \dot{E}_{x,27} - \dot{E}_{x,24} = \dot{E}_{x,\text{coolingwater,out}} - \\ \dot{E}_{x,\text{coolingwater,in}} + \dot{I}_{\text{dest,condenser}} \end{aligned}$
Turbine(ORC)	$\dot{E}_{x,26} - \dot{E}_{x,27} = \dot{W}_{\text{turbine}} + \dot{I}_{\text{dest,Turbine}}$

Results

The modeled system has two parts as combined cycle and ORC. The combined cycle part is the combination of Brayton and steam Rankine cycles. The calculated exergy efficiency results of the combined cycle part of the system is shown in the Table 4.

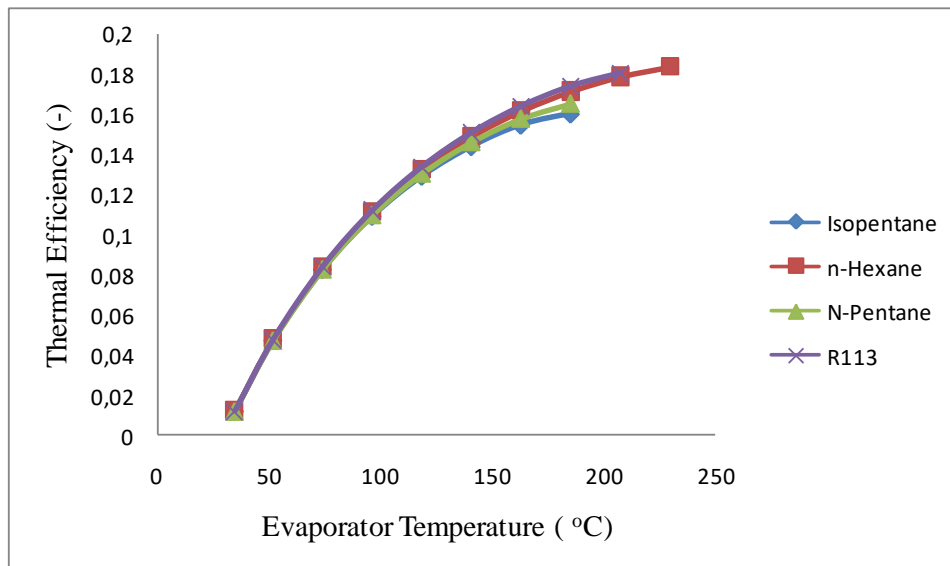
Table 4: Exergy efficiency of the components(Combined Cycle)

Component Name	Exergy Efficiency
Compressor	0.94
Combustion chamber	0.64
Gas turbine	0.81
Heat recovery unit	0.71
Steam turbine	0.81

The exergy efficiency and the exergy destruction rates of the components of the ORC part have been investigated parametrically with the varying turbine inlet temperature. Working fluid is an another variable for the study and the thermal efficiency of the components of the ORC has been calculated with the changing working fluids and the obtained results are shown in the following sections.

The working fluids of the ORC can work in a specific temperature range. When the evaporator temperature value exceeds the critical value of the temperature, the cycle can not work properly. The relation between the evaporator temperature and the thermal efficiency of the ORC is shown in Figure 4. It can be seen that n-hexane and R113 have higher working temperature range. In the study approximate temperature value of the flue gas is 120 °C, n-hexane and R-113 have better thermal efficiencies at that temperature when compared with the other fluids. When taking into the account the thermal efficiency and wider operating temperature range for working fluid selection these two fluids can be accepted as more suitable options.

Figure 4: Relation between the evaporator temperature and thermal efficiency



When exergy destruction equations applied on the components of the ORC, it is seen that evaporator and condenser have lower exergy efficiencies. This is the the result of inefficient heat transfer rate between the working fluid and the flue gases and cooling water. To improve the efficiency of these components further design studies have to be realized. In Table 5, the exergy efficiencies of the system components are shown for n-Hexane and R113 as a working fluid According to the results n-Hexane can be a better working fluid option because it has higher efficiency values.

Table 5: Exergy efficiency of the components(ORC)

Component Name	Exergy Efficiency (working fluid: n-Hexane)	Exergy Efficiency (working fluid: R113)
Turbine	0.97	0.97
Evaporator	0.66	0.26
Condenser	0.38	0.4
Pump	0.97	0.91

Conclusion

The existing power plant system is a combination of steam and gas turbine cycles but the system has still potential to produce extra power due to the flue gases having high temperature values. So integrating another power cycle can be a good option. Organic Rankine cycle comes forward among the options, because the temperature profile of the flue

gases fits to the working temperature ranges of the organic fluids. And most organic fluids have low global warming and ozone depletion potential so they can be used easily in the new environment policies.

Simulation results show that the most exergy destruction rate occurs in the evaporator thus different design alternatives has to be considered for the evaporator.

Besides the electricity production, district heating application can be designed to improve the overall thermal efficiency.

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Evaluation of Dynamic Behavior of Piles Subjected to Hydrodynamic Forces

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Abstract

The paper presents numerical analyses to investigate the dynamics of piles under wind-generated regular wave forces. The dynamic interaction effects between the foundation and the underlying soil are considered for different soil stiffness conditions. The displacement function of the physical system in which dynamic analysis is performed by the single degree-of-freedom (SDF) model. The pile subjected to wave forces represented by the Linear wave theory. Morison equation is employed to obtain lateral wave forces. The dimensionless partial differential equations of motion are converted into matrix equations and solved by finite difference method (FDM). The pile is clamped at the bottom while the translational and torsional springs are placed at the top boundary. MAPLE software is used for deriving the flow solution. The values of displacement and deflection of the pile are determined. The results are presented in graphs.

Keywords: Dynamic behavior, Finite Difference Method, Regular waves, Soil-pile interaction

Main Conference Topic: Engineering

Introduction

The dynamic behavior and stability of piles has been investigated thoroughly by many researchers due to technological importance. The problem of soil-pile-fluid is so complex that is not possible to examine every facet of this relationship. Nogami is used Winkler model to consider the soil-pile interaction in the dynamic response analysis. The offshore environment is characterized by the existence of a fluid inside and above the seabed.

The computed amplitude values of the lateral displacement of the pile at the head are presented (Nogami, 1991). The time histories of unsteady regular wave forces are obtained by means of the physical model tests, and a numerical contact model for the pile-soil interaction is established by Wang et.al.. The relative deformation of the piles and the distribution of the bending moment on the piles are analyzed (Wang et al., 2015). The soil around the pile and the interaction between the pile and soil under wave action is investigated by Jian-jun et al. The FLAC3D software platform is employed to analyze the dynamic response of steel pipe pile-soil system under different conditions of wave load. Shear stress increases with the increase of frequency, wave velocity, wave height, and decreases with the decrease of steel pipe pile wall thickness; the horizontal displacement with frequency, wave velocity, wave height increases and increases, with the wall thickness of the steel pipe pile increases and decreases (Jian-jun et al., 2013) Abdelhamid and Shamy (2014) employ two-

dimensional model to study fundamentals of flood-induced failure of geotechnical systems while taking into consideration the effect of soil-fluid-structure interaction (Wang & Sitar, 2014; Yang & Jeremić, 2002).

In this study, dynamic behavior of piles that are commonly used in offshore structures like piers, are investigated. Non-homogeneous soil models are used in the analysis of the part of the pile in the ground. The drag and the inertial wave forces are calculated with water particle velocities and accelerations due to Linear wave theory. The resulting hydrodynamic wave force on pile in an unsteady viscous flow is determined using Morison equation. The displacement function of the physical system in which dynamic analysis is performed by the SDF model. The equation of motion is solved by FDM method.

Mathematical Model of Motion

The system used in this study consists of a pile of total length L cross-sectional area A , density ρ , mass per unit length m , Young's modulus E and moment of inertia I . The pile model is designed by considering soil resistance that is represented by stiffnesses of translational springs k as well as wave F_H forces as given in Figure 1.

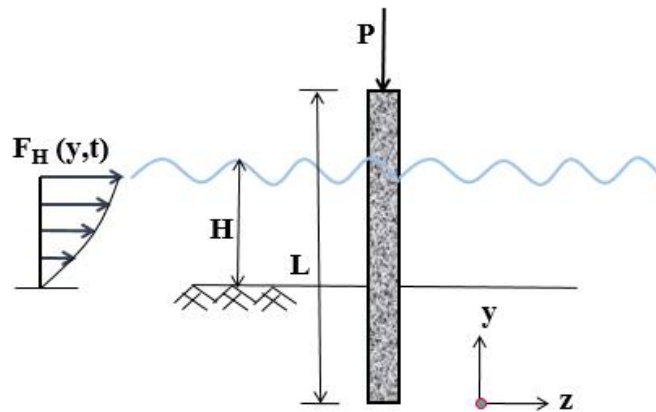


Figure 1: The model of pile

The wave parameters were utilized to compute the hydrodynamic wave forces acting on pile. The wave height H , wave length L and wave period T are major wave parameters (CERC., 2002; Ergin, 2010). The orbital motion of the water particle is significant for the horizontal hydrodynamic force. The force consists of two components: a drag force F_D and an inertial force F_I (Chakrabarti, 2005). The drag force and the inertial force are proportional to the fluid particle velocity and fluid particle acceleration respectively. The equations of fluid particle velocity u and acceleration \dot{u} according to Linear wave theory are given as below

$$u = \frac{\pi H}{T} \frac{\cosh[(2\pi/L)(d+y)]}{\sinh 2\pi d/L} \cos \theta \quad (1)$$

$$\dot{u} = -\frac{2\pi^2 H}{T^2} \frac{\cosh[(2\pi/L)(d+y)]}{\sinh 2\pi d/L} \cos \theta \quad (2)$$

Where $\theta = \frac{2\pi}{L}x - \frac{2\pi}{T}t$ and called as phase angel. The total lateral hydrodynamic force F_H which is included drag and inertial forces, obtained by the Morison equation as follows:

$$F_D = \int_{-d}^{\eta} \frac{1}{2} \rho_w C_d D(y) u(y,t) |u(y,t)| dy \quad (3)$$

$$F_I = \int_{-d}^{\eta} \frac{1}{4} \pi \rho_w C_M D(y)^2 \frac{du(y,t)}{dt} dy \quad (4)$$

These two components are added together to give the Morison equation.

$$F_H = \int_{-d}^{\eta} \frac{1}{2} \rho_w C_d D(y) u(y,t) |u(y,t)| dy + \int_{-d}^{\eta} \frac{1}{4} \pi \rho_w C_M D(y)^2 \frac{du(y,t)}{dt} dy \quad (5)$$

Where ρ_w is salty water density, D is represented as the diameter of pile. As seen Eq. (3) and Eq. (4), drag force coefficient C_d and inertial force coefficient C_M are needed to calculating force components. Dynamic behavior of pile can be formulated based on the above equation of motion

$$EI Z^{IV} + PZ'' + k(y)Z(t) + m \frac{d^2 Z(t)}{dt^2} = F_H(y,t) \quad (6)$$

Where Z is the coordinate vector, m is the mass k is the coefficient of stiffness. The external force is equalized to the inertia, damping and restoring forces. Moreover, $\frac{dZ(t)}{dt}$ is the velocity, $\frac{d^2 Z(t)}{dt^2}$ is the acceleration and P is the axial force, $F_H(y,t)$ is the external force. (\cdot) denotes derivative with respect to time d/dt .

Numerical Analysis

Dynamic behavior can be assumed to be harmonic because the equations of motion is linear. The pile has been divided into segments with a length of Δ_y .

The first, second, third and fourth order space derivatives are approximated by the centered difference formula respectively and hence

$$Z_n' = \frac{Z_{n+1} - Z_{n-1}}{2\Delta y} \quad (7a)$$

$$Z_n'' = \frac{Z_{n+1} - 2Z_n + Z_{n-1}}{\Delta y^2} \quad (7b)$$

$$Z_n''' = \frac{Z_{n+2} - 2Z_{n+1} + 2Z_{n-1} - Z_{n-2}}{\Delta y^4} \quad (7c)$$

$$Z_n^{iv} = \frac{Z_{n+2} - 4Z_{n+1} + 6Z_n - 4Z_{n-1} + Z_{n-2}}{\Delta y^4} \quad (7d)$$

Here Z_0 and Z_n are the known initial and boundary values.

Boundary Conditions

Since the pile displacement $Z(y, t)$, the pinned condition is assumed at the beginning of pile. The translational and torsional springs were placed at the end of the pile (McClelland et al., 1969; Eicher et al., 2003)

$$y = 0 \rightarrow Z(0, t) = 0 \quad (8a)$$

$$y = 0 \rightarrow Z'(0, t) = 0 \quad (8b)$$

$$y = L \rightarrow Z''(L, t) = \frac{\mu}{EI} Z'(L, t) \quad (8c)$$

$$y = L \rightarrow Z'''(L, t) = \frac{c}{EI} Z(L, t) \quad (8d)$$

Where stiffness of translational spring and stiffness of rotational spring are expressed by c and μ respectively.

Numerical Results

MAPLE software is used for deriving the flow solution. The dimensionless displacements are determined for various soil conditions. The results for different soil types at the same thickness are given in Figure 2.

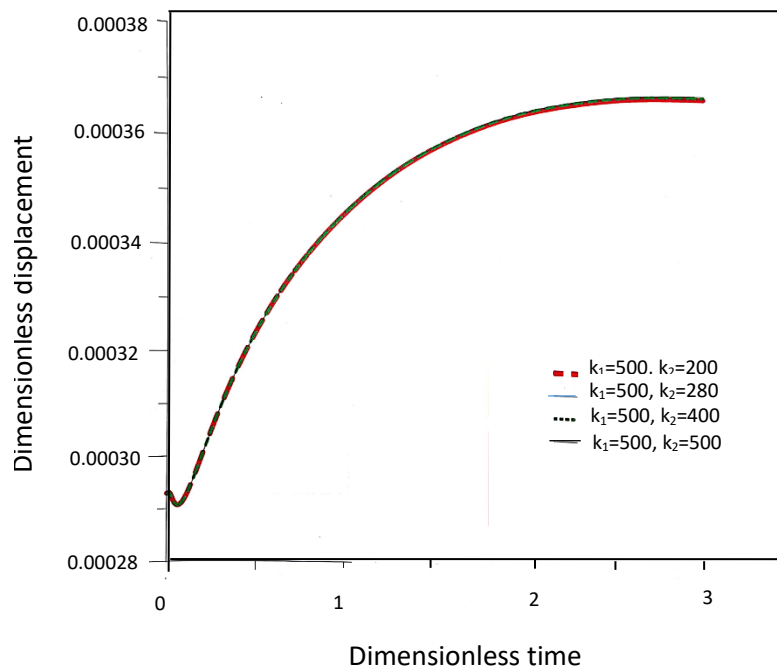


Figure 2: The dimensionless displacements of pipe versus soil stiffness coefficient k_2

As shown in Figure 2, Similar values of the displacements are obtained while k_2 increases and k_1 keep constant. The stiffness coefficients: k_1 and k_2 are represented two different types of soil.

As seen in Figure 3, k_1 gives visible change on the displacements values of the pipe.

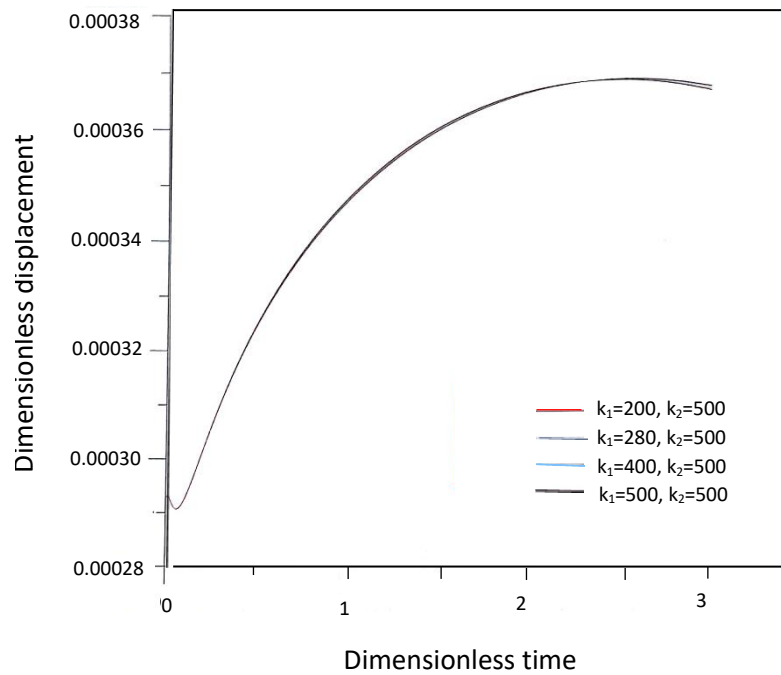


Figure 3: The dimensionless displacements of pile versus soil stiffness coefficient k_1

In Figure 2 and Figure 3, pile is buried in the soil expressed by k_1 until to $L/4$ and soil expressed by k_2 until to $L/2$. Figure 4 shows the relation between the displacements with time while k_1 increases and k_2 keep constant.

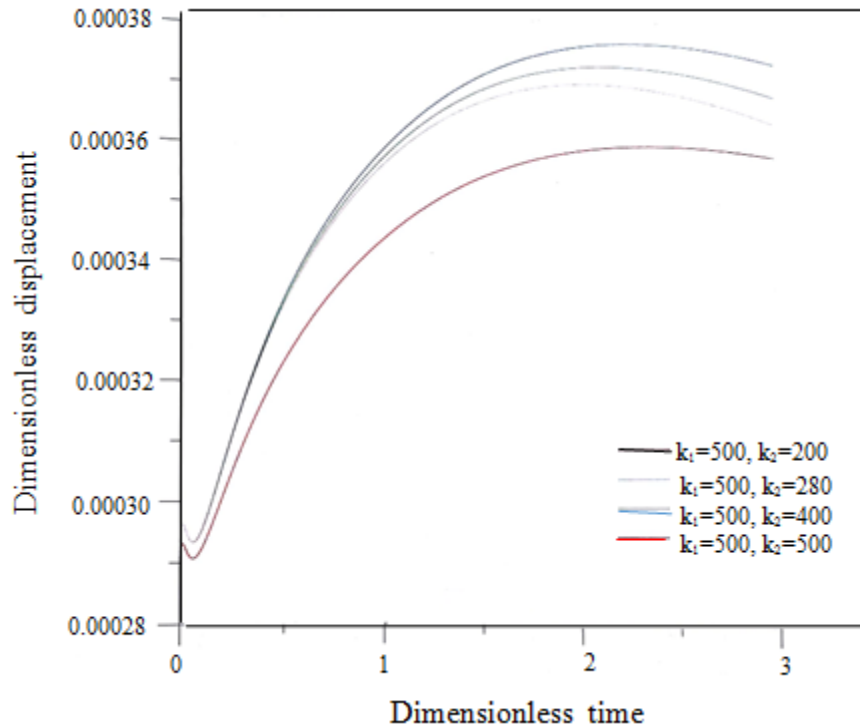


Figure 4: The dimensionless displacements of pile versus dimensionless time

In Figure 4, pile is buried in the soil expressed by k_1 until to $L/4$ and soil expressed by k_2 until to $3L/4$. As seen in Figure 4. The values of displacement decreases as the stiffness coefficient increases. On the other hand, the stiffness coefficient provides a relatively small effect on the displacement for the pile buried till half, but provides a great deal of variation for the pile buried till $3L/4$.

Conclusion

In this paper the dynamic interaction effects between the foundation and the underlying soil are investigated for different soil stiffness conditions. The pile is modeled by considering soil resistance that is represented by stiffness of translational springs. The soil consisting of two different layers, is not homogeneous. Pile is subjected to water wave that is designed by Linear Theory and computed with Morison Equation. Dynamic behavior is represented by differential equations of motion and solved by FDM. As seen in the graphs, for non homogeneous soil, layer thickness is effective on displacement of piles under wave forces. As expected, the values of displacement decreases as the stiffness coefficient of soil increases. Similar values of the displacements are determined for different soil types at the same layer thickness.

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A New Method to Medical MRI Images Restoration with Swarm Intelligence

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Abstract

Due to the limited speed of sensors in MRI imaging, the sampling at Nyquist rate will result in elongation of the imaging time. This causes the patient's discomfort, motion-induced geometric deformities, and thus, reduces the image quality. In this study, we provided a new method for reducing the image noise, in which the signal sparse representation was used to restore the degraded and noisy areas. The particle swarm optimization was also used to improve the accuracy of the sparse representation. The simulation results indicated that the proposed method has a higher efficiency than most of the popular noise removal methods both in terms of PSNR (Peak signal-to-noise ratio) parameters, MSE (Mean Square Error) and the image quality. It is also a more powerful approach in retrieving subtleties and details of the image than the most available prominent noise removal methods.

Keywords: keyword 4 Image Restoration, Noise Reduction Sparse Representation, Swarm Intelligence, Peak Signal-to-Noise Ratio.

Main Conference Topic: Engineering, IT, Artificial Intelligence

Introduction

Magnetic Resonance Imaging (MRI) is nowadays used as a common imaging modality in medical diagnostics and research projects. MRI is a non-invasive imaging method that does not use the radiation properties unlike other modalities such as Computerized Tomography, (CT). Also, unlike Positron Emission Tomography (PET) does not require the use of radioactive markers. MRI imaging is one of the important modalities in medical imaging due to high contrast in soft tissues. There is usually a compromise between imaging time, resolution, and the Signal to Noise Ratio (SNR) levels in the MRI imaging.

The acquisition of a one-dimensional MRI image was reported by Herman Carr in 1950. Working on previous research, Paul Lauterbur, an American chemist, succeeded in devising methods to produce two-dimensional and three-dimensional MRI images. Eventually, he released the first image taken based on the Nuclear magnetic Resonance (NMR) from a live rat in 1973. On the other hand, important research and developments were made for the first time at the University of Nottingham in England by Peter Mansfield in the field of imaging based on the NMR. By expanding a mathematical approach, the prominent physicist, Peter Mansfield, managed to reduce the imaging time and enhance the quality of the images compared to the method used by Paul Lauterbur. MRI was invented in the early 1970's, but the first MRI imaging devices were introduced to the market ten years later. Finally, the 2003 Nobel Prize in Medicine was awarded to Paul Lauterbur and Peter Mansfield from England for the invention of MRI [1].

The basis of MRI is the spinning motion of specific nuclei in the living tissues. This spin is resulted from individual spins of protons and neutrons inside the nucleus. The subatomic particles pairs automatically do spinning movement in opposite directions, but with the same speed. In nuclei with an even mass number, i.e., equal number of protons and neutrons, a half of the spins are in one direction and the other half are in the opposite direction; therefore, the nucleus itself does not have a pure spinning motion. In nuclei with an odd mass number, that is, where the number of neutrons is slightly more or less than the number of protons, the spin directions are not the same and the opposite. Thus, the nucleus, itself, has a pure spin or angular momentum. These are called active MR nuclei. The active MR nuclei are indicated by arranging their axis of rotation in the direction of an external magnetic field. This arrangement occurs because the active MR cores (nuclei) have an angular momentum or spin. The major active nuclei are hydrogen, carbon, nitrogen, oxygen, fluorine, sodium and phosphorus [2].

Applying a radio excitation field of B_1 to the polarization vector applies moment to it and deviates it and creates the magnetic component of the M_{xy} , which is perpendicular to the field. This magnetic component rotates by a frequency of $f_0 = \gamma/2\pi B_0$. In this equation, B_0 is the intensity of the static magnetic field and $\gamma/2\pi$ is a constant coefficient equal to $42.57^{\text{MHz/T}}$. For example, a typical 15T MRI device has a frequency about 60MHz. The vertical component of this vector of magnetization produces a signal, which can be received by a coil. This component represents many of the tissue characteristics. The proton density in the tissue is one of the tangible features that can be displayed in it. In fact, the signal that we are looking for in the MRI is the same component, which is an image of the spatial distribution of the vertical magnetization vector [3].

Creating an MR image usually requires the gathering of a set of information, which is called collection. At each collection stage, an RF stimulation creates a new vertical magnetization, which is then sampled on a specific path in the space k [4].

In general, a complete MR image can be made with a single retrieval on a path that travels the total space k [5]. This state is most commonly used in applications such as brain activity imaging. However, these results will result in an image with inadequate resolution and sharp image artifacts for many applications. The magnetization vector is exponentially damped with time, which limits the effective collection time period. Though, the function of the gradient system and the physiological limitations limit the speed by which the space k is traveled. The combination of these two effects reduces the total number of symbols per collection product. Consequently, most MRI imaging use a sequence of restorations that each of them samples a part of the k space. Then, the information obtained is developed from a sequence of restorations to create the image.

MRI is a non-invasive method and does not use ions radiation properties unlike other imaging methods such as CT. The long time required to record Echo Resonance has led to performing many studies to speed up the imaging. Image acquisition in medical imaging devices is obtained during a process called "Image Reconstruction". Image reconstruction in MRI is slightly different from image reconstruction in other medical imaging equipment, which is due to different functional physics in it compared to other equipment.

Noise removal in digital images

With the increasing spread of various techniques for getting widespread information, the image processing has been widely used nowadays. However, the images resulting from the image signal producing devices always contain some noise and distortion, which reduces the image resolution. The set of operations and methods used to reduce defects and increase the quality of the image, or to recognize and compress it are called image processing [6].

Image processing involves a wide range of areas of work. However, in general, the attention has focused on four areas of the Apparent Image Enhancement Quality, Damaged Image Restoration, Image Compression, Encryption and Image Understanding by the machine. Meanwhile, the set of techniques used to reduce noise with a special and distinguished place in image quality improvement include methods such as the use of fading filter and contrast adjustment to improve the appearance and ensure the proper image representation in the destination environment [7].

Generally noise is present everywhere, and wherever a signal is measured, a noise will certainly be created on it. The minor changes are those not from the original image. Noise in the image is created in the process of image signal production by sensors or digital cameras circuits. These environment changes are created unwantedly and are unfavorable I users' eye. The noise amplitude involves a range from a good resolution image to an image that is almost completely destroyed. Every high-quality and precise experiment done in the physics world needs a lot of accuracy and precision to predict the noise of the environment and reduce its impact. The significance of the noise analysis appears entirely when the quality of the signal measured is not determined by the absolute value of the signal energy, but is determined from the signal-to-noise ratio. The research results show that the best approach to improve the signal-to-noise ratio is to reduce noise rather than to increase the signal strength. Random noise is uncontrollable by definition and its exact amount varies in different experiments [8].

Removing and reducing noise is seen as one of the most important issues in the field of image processing. An image contaminated by environmental noise has an inappropriate visual quality and is not suitable for analysis and understanding by the user. In addition, many common processing applications, including Edge Detection, Segmentation and Machine Vision are impaired in the presence of noise [9]. Thus, the removal of the noise effect added to the image seems vital in all processing areas.

Different perspectives have been proposed to remove the noise effect from the image signal, which are very diverse depending on the type and density of the noise added. A filter used to remove Gaussian noise may have not a proper result in removing the salt-and-pepper noise. On the other hand, the use of a strong filter to reduce a low-density noise will degrade the visual quality rather than just improving the image. The filters used to remove noise effects from the image signal in general are divided into two categories of spatial area filters and frequency area filters.

The spatial field filters performance is based on processing on the pixel brightness level surface related to the adjacent pixels. The processing operation may focus only on the pixel brightness level. In this case, the operation will be performed bit by bit. Also, the pixels neighboring with the original pixel can be used to remove the noise effect. The second method becomes feasible based on a large similarity between the brightness levels of the images adjacent pixels [9]. Some of the most important commonly used filters in the time domain include the mean filter, median filter, adaptive median filter, maximum and minimum filters.

Contrary to the location (spatial) filters, which deal with the brightness level of one or more pixels of the image, the transmission of the image into the frequency domain by taking the two-dimensional Fourier transform of the image signal will simplify the removal of the noises that have damaged the image in a limited frequency band. In the case of adding the collective environmental noise to the image, the frequency domain filters fall into 3 categories: Band-stop filters, Band-pass filters, and Notch Filters [9].

The proposed method

The proposed method of repairing medical images is based on the dictionary learning approach. In the following, the issue of choosing the proper dictionary for atomic decomposition applications and its importance was discussed. Then, using the K-SVD algorithm, the dictionary learning problem was explained by employing a number of training signals. In the next step, an efficient algorithm was provided to achieve the most sparse signal representation (signal sparse coding) by using the Particle Swarm Optimization (PSO) method.

Step 1. Selecting the dictionary

In recent years, the sparse representation of data has been extensively used for applications such as sampling, compression, representation, retrieval and classification of images [10]. The success of the sparse representation in these applications results from the fact that most natural signals such as image or sound have sparse representation by considering specific bases. Natural signals often do not cover the entire space and are placed on a subspace of manifold.

Consider the signal of $x = [x_1, x_2, \dots, x_n]^T \in \mathbb{R}^n$. This signal can specify the pixels of an image. The assumption of scarcity states that the data can be expressed as a linear combination of few bases already considered. If we show the number of these nodes effective in the representation of x with k , this number should be significantly smaller than the data original space dimension ($k \ll n$).

The bases used to display the data are placed in a matrix. This matrix is called the Dictionary Matrix. This matrix generally covers the entire vector space related to the data. In other words, the columns of this matrix are used to construct the whole or a part of the data belonging to vector space of \mathbb{R}^n . Each of the dictionary matrix columns, which are the bases required to model the data, is called an Atom. If the number of the dictionary atoms is as large as the vector space dimension and the bases cover the whole space, the matrix of the dictionary is called Complete. In this case, each data will have a unique representation by the dictionary atoms. For example, in the Fourier transform, the transform bases are constant and perpendicular to each other and each data will have its own specific coefficients. If the dictionary matrix is complete, the representation of each data by this matrix will be unique and not necessarily sparse. If the number of dictionary atoms is increased to be more than the complete state and a number of atoms are added to it, then, the dictionary is called over-complete in this case. If D represents the dictionary, in the relation $x = D\alpha$, the x data is written by the linear composition of the atoms and α shows this linear combination. Since the matrix is over-complete, the linear equation system will be underdetermined for determining the undefined α . This system will have countless answers that the answers are located on a vector space. We add another condition since we are looking for the sparsest representation of the existing representations. A constraint should be added to the problem to limit the number of non-zero entries of the sparse representation.

The sparse representation of signal x is shown in relation 1. In this equation, α is a vector that contains the signal sparse representation.

$$\alpha = [x_1, x_2, \dots, x_k]^T \in \mathbb{R}^k$$

The norm zero, $\|\cdot\|_0$ counts the number of non-zero elements of the matrix in this relation. This number indicates the sparsity of the representation.

$$\argmin \|\alpha\|_0 \quad \text{s.t. } x = D\alpha \quad (1)$$

The relation 1, also called P0 problem, can be expressed in other forms as well. The sparsity rate can be also stated in the form of a constraint. In relation 2, the sparsity is described in the form of a constraint and the purpose of optimizing is to reduce the error between reconstructing the signal with sparse representation and the initial signal.

$$\text{argmin } ||x - D\alpha|| \quad \text{s.t. } ||\alpha||_0 \leq K \quad (2)$$

Solving problem 2 in general requires solving an NP-HARD problem. Many greedy methods have been used to solve this problem. The most important and, at the same time, the easiest method available is Orthogonal Matching Pursuit (OMP) method, which has been used in the proposed method. In the OMP method, we look for a maximum K vector of the dictionary vectors set, which can display the initial signal with the lowest error. For this case, in K steps, the best vector and the proper coefficient for making the signal is chosen correspondingly step by step. Theoretically, one can provide a guarantee in certain modes for the answer given by the OMP method that would be the sparsest possible answer. These conditions depend on the dictionary matrix. The OMP method is presented to obtain the sparse representation of the simplest method. However, this method does not find the optimal sparse answer in many cases. Many methods have been provided based on the OMP and later on. But a problem with all these methods is that they solve the NP-HARD problem in a greedy way. In fact, they do not consider all possible modes for using the atoms.

Converting the problem into a convex optimization ensures the achievement of the sparsest answer using the convex optimization methods such as the Gradient Descent method. However, solving this problem and obtaining a precise answer will be very time consuming. The implementation time of this problem is one of the main challenges in the Compressed Sensing (CS) area. This time is highly important in our particular problem of classifying the images since the number of images and pieces of the image are very large and the sparse representation should be calculated for each of them.

By considering the run-time, the greedy methods still are superior to the convex optimization methods. But approximately solving the problem is another approach. Instead of exact solving of the problem (P1), another approximation problem can be defined that will have a close answer to the original answer. The relation 3 presents the approximate form of the problem (P1). In this relation, the parameter δ is a small value considered to display the difference between the data representation and the data itself.

$$\text{argmin } ||\alpha||_1 \quad \text{s.t. } ||x - D\alpha||_2 = \delta \quad (3)$$

Relation 3 is also used to model the data noise. If we assume a Gaussian noise with a specific and small variance for the data, an appropriate response will be obtained for δ by optimizing this equation.

As stated, one of the main challenges in the area of signal processing is finding a model to represent the signal in an appropriate form by considering the objective of the problem. The easiest solution is to use the linear combination of data to get a new representation. This method is used in the Principle Component Analysis (PCA). In this method, we assume that the data has been generated by a Gaussian process. This assumption is not always true for natural data and some processes often play a role in generating the signals. The Independent Component Analysis (ICA) method is one of the approaches provided to solve this problem. It is theoretically proven that the method is not effective enough in analyzing the data generated by a large number of processes since in both of these methods; the maximum number of independent components is limited and equal to the size of the data space dimension.

The natural signals are caused by different factors that few of them participate in the generating of each signal. Therefore, the number of constructive bases for these signals

should be considered more than the space dimension. Also, the basic assumption is that the number of constructors is limited for each signal. From another perspective, the data in the previous methods are placed on a subspace. This assumption limits the space of the signals learned by the model. Observing the effectiveness of the mentioned methods, a question arises that whether a model can be provided for the data placed on more sub-spaces. Choosing these subspaces also plays an important role in displaying the data. In the dictionary learning, we look for atoms that create subspaces for displaying the data. Finding this dictionary is a very complicated task in some cases. For example, consider the image pieces. These data cannot be displayed with a linear combination and on a linear sub-space. The glossary should be determined in such way to solve these problems that the scarcity constraint is established in the representation of all training data.

Obtaining a definitive answer to the problem of learning is not possible. However, a local optimal answer can be achieved by a two-step repetitive method. In the first step, we assume that the dictionary is constant and solve the optimization problem according to the values of the sparse vectors. This stage is typically called sparse coding. In the second step, the vectors are fixed and the dictionary is changed to minimize the optimization phrase. The gradient descent method can be used for the second step. These two steps are repeated consecutively until the dictionary is converged. As the sparse coding step is very time-consuming in case of large vectors, the pieces of image used for learning are usually selected with small sizes (up to 32×32).

Step 2. The dictionary learning

The problem of dictionary learning is, in fact, very similar to Vector Quantization (VQ) problem. In the proposed method, we want to display a large number of vectors by atoms with fewer numbers. This task is indeed the equivalent of data clustering since each vector will belong to one of the atoms and the goal is to minimize the total distances of vectors and their corresponding atoms. The K-Means method is presented to solve this problem, which is one of the most successful and widely used methods for data clustering [11]. Similarly, the objective in the dictionary learning is to find atoms for the dictionary. Instead of an atom, a linear combination of a limited number of atoms can be used to display each individual vector of the data. A solution similar to the K-Means approach provided to solve this problem was similar to previous methods of the dictionary learning like MOD with the difference that in the updating stage, the dictionary changes the atoms and the coefficients of their use. At this stage, the Singular Value Decomposition (SVD) is used. Thus, this algorithm is called K-SVD. Following the process, the K-SVD algorithm and the efficient optimal encoding method, which is one of the successful methods in solving a norm 1 problem, were presented in the proposed method of the K-SVD algorithm for dictionary learning. This algorithm updates the dictionary step-by-step to eventually converge to the optimal answer with a proper number of implementation of the steps. The K-SVD algorithm consists of two phases that are run in succession. The first phase is sparse signal coding, while the second phase updates the dictionary atoms based on the codes obtained. The Particle Swarm Optimization (PSO) algorithm was used for the first phase. Both phases of this algorithm are designed to optimize the target function. These two phases are compatible with each other, and the successive implementation of these two phases converge the dictionary atoms toward the optimal answer. However, there is no proof for the convergence of this method and the algorithm may not converge in some cases.

Step 3. Optimization

The PSO is a meta-heuristic algorithm that can search very large spaces of candidate solutions without any hypothesis or with a few assumptions about the problem under optimization. More precisely, the PSO is a pattern searching method that does not use the gradient of the problem under optimization. This suggests that unlike the classic optimization methods such as the downside gradient methods and the pseudo-Newton method, the PSO does not require the optimization problem to be differentiable. Thus, it can be used for optimization problems that are somewhat irregular, noisy, variable with time, etc. The source of inspiration for this algorithm has been the social behavior of animals such as the massive movement of birds and fish. As the PSO also begins with an initial randomized population matrix, it is similar to many other evolutionary algorithms such as continuous genetic algorithm and colonial competition algorithm. Unlike the genetic algorithm, the PSO has no evolutionary operator like mutation and coupling.

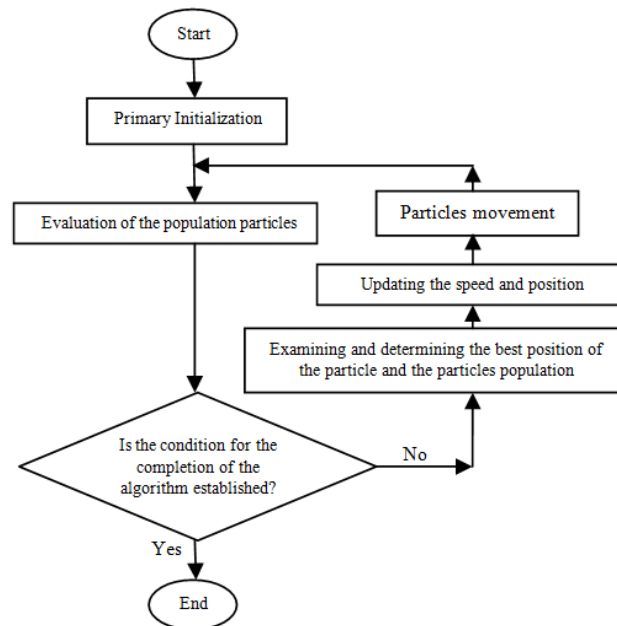


Figure 1: PSO Algorithm

Each population element is called a particle. In fact, the PSO algorithm consists of a certain number of particles that randomly get an initial value. Two state and speed values are defined for each particle, which are modeled with a vector of space and a velocity vector, respectively.

These particles move recurrently in the n-dimensional space of the problem to search the new possible options by calculating the optimal value as a measurement criterion. The dimension of the problem space is equal to the number of parameters found in the function to be optimized. A memory is assigned to store the best position of each particle in the past and a memory for storing the best position occurred among all the particles. With the experience resulting from these memories, the particles decide how to move in the next step. At each repeat, all particles move in the n-dimensional space of the problem to finally find the general optimal point. The particles update their speeds and position according to the best local and absolute answers.

The PSO algorithm updates the speed vector of each particle and then adds the new velocity value to the position or value of the particle. The speed updates are influenced by both values of the best local answer and the best absolute answer. The best local answer and the best absolute answers are the best answers that have been obtained until the moment of

the algorithm implementation respectively by a particle and in the whole population. The main advantage of PSO algorithm is its simple implementation as well as its need to determine a few parameters. The PSO is also capable of optimizing complex cost functions with a large number of local minimums.

Simulation & Conclusion

The simulation was made on a set of 8-bit medical images with gray scales, dimensions of 256×256 , and with different and high noise density by a computer means with the characteristics given in Table 1. Each of the images was destroyed with a noise density of 25% and 50%. This number represents the percentage of degraded image pixels. Three standard images were selected as in Fig 2 from the set of generated images. The experimental images produced were noise-removed once by the proposed method and once without the proposed method.

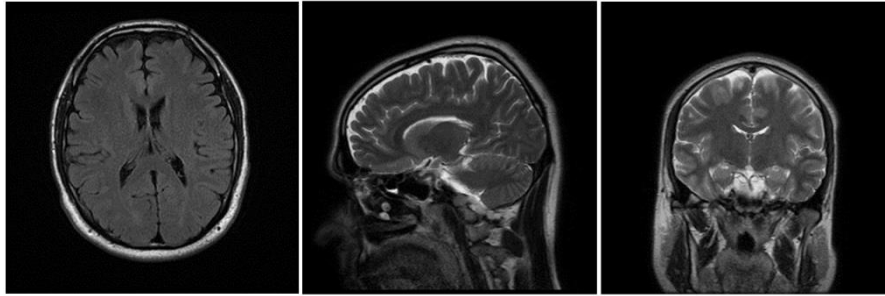


Figure 2: An example of multiple MRI images

Three criteria of comparing visual quality, the Mean Square Error (MSE) and the Peak Signal to Noise Ratio (PSNR) were used to evaluate the performance of the proposed algorithm in the present study to remove noise from MRI images. The MSE criterion measures the difference between the original and the reconstructed images in accordance with equation (4) by dB:

$$MSE = \frac{1}{RC} \sum_{r=1}^R \sum_{c=1}^C (s[r,c] - y[r,c])^2 \quad (4)$$

Where $y(r, c)$ and $s(r, c)$ are respectively the brightness level of pixel (x, y) in two natural and reconstructed images. The PSNR criterion indeed represents the amount of noise power of an electric system vs. the power of the signal itself:

$$PSNR = 10 \log_{10} \left(\frac{\max_i^2}{MSE} \right) \quad (5)$$

The high value of this number indicates the more closeness of the retrieved image to the original image for a certain amount of noise density. In fact, the higher this indicator, the better it is, and shows more useful signal. The qualitative measurement of the accuracy of the proposed algorithm is also done by comparing the visual quality of the original and reconstructed images.

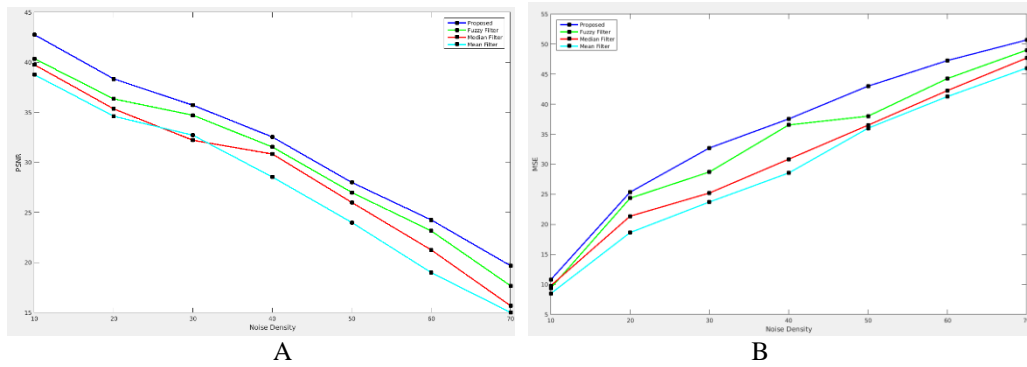


Figure 3: (A) Mean Square Error (MSE) graph for noise cancellation filters (B) Peak Signal to Noise Ratio (PSNR) criterion of noise removal filters

The results indicate that the use of the algorithm introduced in this study has a better performance than conventional noise removal techniques for all the noise density values.

In this paper, the concepts of MRI imaging, the principles and details of image processing, and noise removal techniques were examined. The proposed technique in this research to repair and remove noise of medical images was based on the sparse representation of the signal that the particles swarm optimization algorithm was used for its optimization. Unlike previous algorithms to remove noise from MRI images, which assume the noise density to be known or use a simple and inaccurate estimate of it as a criterion, the proposed method introduced a step-by-step and structured method for accurately estimating the image noise density, which efficiency was very suitable for noises with the density of 90%.

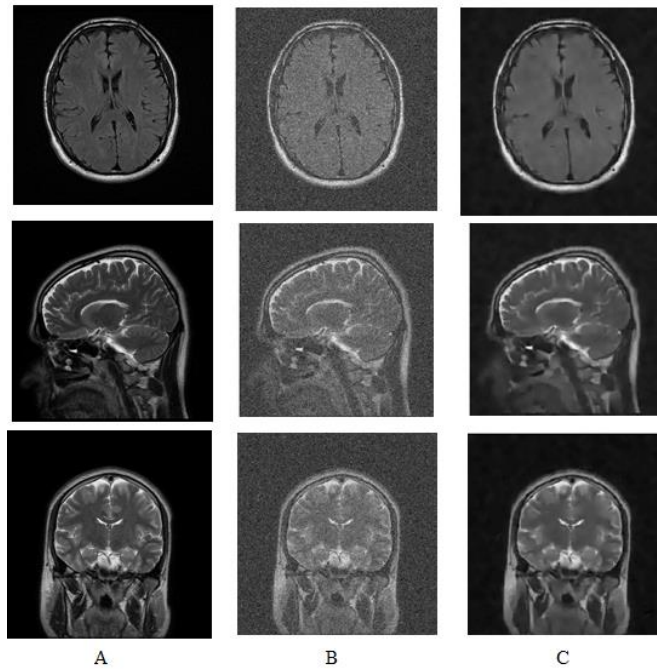


Figure 4: Visual results of restored images of three MRI images. (A) Free-noise original image; (B) Image contaminated with Gaussian noise with a noise density of 25%; (C) Image retrieved by the proposed method

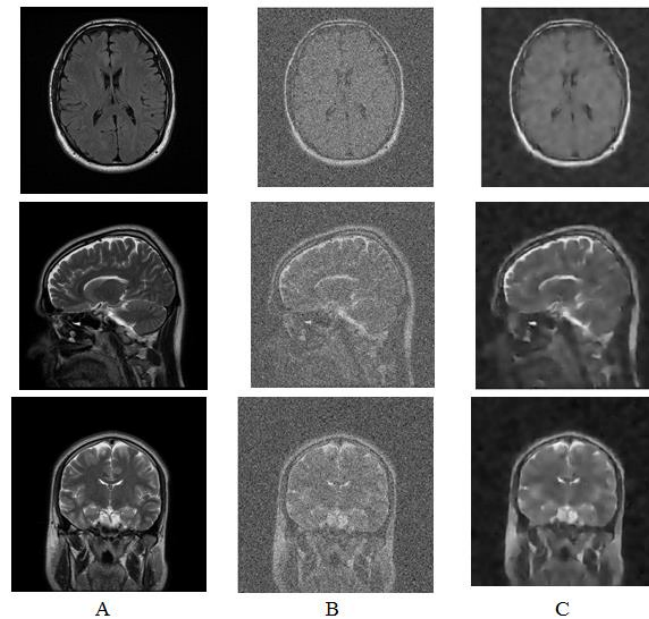


Figure 4: Visual results of restored images of three MRI images. (A) Free-noise original image; (B) Image contaminated with Gaussian noise with a noise density of 50%; (C) Image retrieved by the proposed method

In this paper, the concepts of MRI imaging, the principles and details of image processing, and noise removal techniques were examined. The proposed technique in this research to repair and remove noise of medical images was based on the sparse representation of the signal that the particles swarm optimization algorithm was used for its optimization. Unlike previous algorithms to remove noise from MRI images, which assume the noise density to be known or use a simple and inaccurate estimate of it as a criterion, the proposed method introduced a step-by-step and structured method for accurately estimating the image noise density, which efficiency was very suitable for noises with the density of 90%.

The suggestion for future work can be focused on an even more accurate estimation of the density of noise and identifying the noise pixels. The use of more advanced techniques for replacing detected pixels as noise will improve the noise removal of the MRI images. It is also suggested to work on removing other types of high-density noises. Other methods for continuing the work are fuzzy methods, in which, the noise removal accuracy in MRI images can be increased by using proper membership functions.

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Examination of chaotic vibrations during operation of a fire truck

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Abstract

Examination of nonlinear vibrations is an important task since they could damage and reduce the useful lifespan of devices and their secondary effects could lead to health damage of personnel. A CSD-755 heavy-duty fire truck was chosen for our study. During its operation – which is often carried out under extreme conditions – harmful vibrations can easily occur. The structure of these vehicles is different from conventional vehicles, as the main goal in their design is maintaining their stability and endurance during deployment. In this paper the chaotic vibrations that can emerge during normal operation and their effects were examined with numerical simulations. With the presented results we want to draw the attention to the importance of the topic and to help the safe operation of fire-fighting vehicles.

Keywords: chaotic vibrations, fire truck, numerical simulation, system modeling

Main Conference Topic: Engineering

Introduction: harmful effects of chaotic vibrations

Chaotic vibrations are harmful (Ivancevic & Ivancevic, 2007). In case of mechanical processing they can deteriorate the quality of the product and have negative effects on the human operator (Łuczko et al., 2007). For vehicles chaotic vibrations can lead to early damage or physical injury to the passenger (Marzbanrad & Keshavarzi, 2015). They can cause cyclic stresses and reduce life of the structure (Fakhraei et al., 2017). They can shorten the life of electronic and mechanical components such as electronic boards and cards, computers, engine, transmission and piping system. It can lead to Raynaud's syndrome, chest discomfort, nausea, headaches, fatigue and even more serious health problems (Hung et al., 2012).

This paper first introduces vehicle suspension models used to study chaotic behavior, then the development of our model is described in detail, which is followed by the simulation results. The paper concludes with further development tasks.

Related work: Car suspension models to study chaotic vibration

In the literature there are several simulations which show chaotic behavior of the suspension system. There are 3 main suspension models: the quarter car model (Szauter, 2017), the half car model (Patel et al. 2010) and the full car model (Szauter, 2017). These models are combinations of spring-mass-damper systems, which can be expanded with additional parts, like seats with passengers (Fakhraei et al., 2017) or the engine (Ryba, 1993).

In (Ryba, 1993) a semi active suspension system is developed. For the simulations two different quarter car models were used. When the damping constant was low chaotic vibrations occurred. In (Litak et al.2008) a study was carried out to obtain the critical Melnikov amplitude of the road surface profile above which chaotic vibration occurs in case of the quarter car model. An efficient algorithm to control chaotic behavior in case of a quarter car model is presented in (Litak et al.2007). (Fakhraei et al., 2017) studied the chaotic vibrations of a vehicle with an eleven degree of freedom full vehicle model with passengers. In (Marzbanrad & Keshavarzi, 2015) an air suspension system is studied with a quarter car model. Nonlinear spring and damper is used to investigate the effects of parameter choice on the chaotic response of a vehicle. (Zhu & Ishitobi, 2006) investigates the chaotic responses of a nonlinear full vehicle model. The road profile was assumed to be sinusoidal. It was observed how the time delays between the forcing functions of the tires and the forcing frequency affects the chaotic behavior. (Naik & Singru, 2011) presents a quarter-car model with delayed displacement and velocity feedback. The conditions for chaotic behavior is derived analytically using Melnikov technique.

Most of the literature we have studied deals with the modeling, designing of semi-active suspension systems and observation of new phenomena. Usually generic models are used, the type of the vehicle is not mentioned in a lot of cases. The purpose of our research is therefore to study the chaotic vibrations during the operation of a special fire truck with a passive, rigid suspension system. Before setting up the model and the computer simulation the operation of the selected firefighter vehicle and the dimensions were defined in which the chaotic vibrations were investigated.

Model of the fire truck

Our model is based on a Hungarian heavy-duty fire truck Csepel CSD-755-11. The vehicle has a unique design with suspensions with reinforced leaf springs (Figure 1).



Figure 1.: CSD-755-heavy-duty fire truck and its suspension (by authors)

Fire trucks are designed for special stress, their construction is different from conventional trucks. The CSD-755-11 fire truck has a fire extinguishing water and foam tank attached to the chassis and a built in centrifugal pump which is capable to produce medium and high pressure. In addition to the tanks there are special compartments to store special firefighter equipment.

During operation several kind of harmful load can occur. In this study only the harmful vibrations and their consequences are examined as they have an adverse effect both on the built-in and carried devices. In practice failures like damage to fixing and suspension elements, chassis crack, fractures of springs, shock absorbers and equipment and drive system errors often occur. In order to be able to study the harmful vibrations affecting the equipment later on, half-car model has been chosen. The technical parameters of the fire truck are shown in Figure 2.

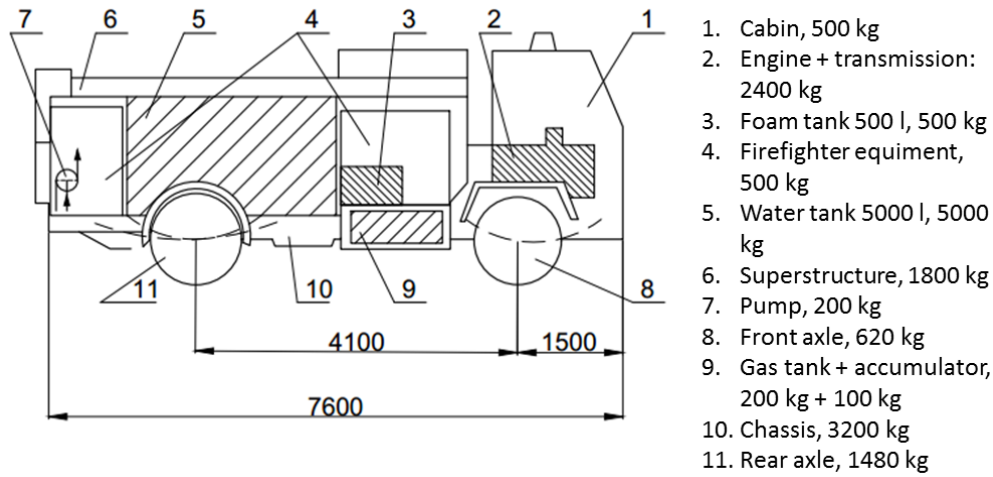


Figure 2.: Technical parameters of the examined fire truck (based on catalog of the manufacturer)

The half-vehicle model based on (Patel et al., 2010) used for simulation after determining the centre of mass is shown in Figure 3.

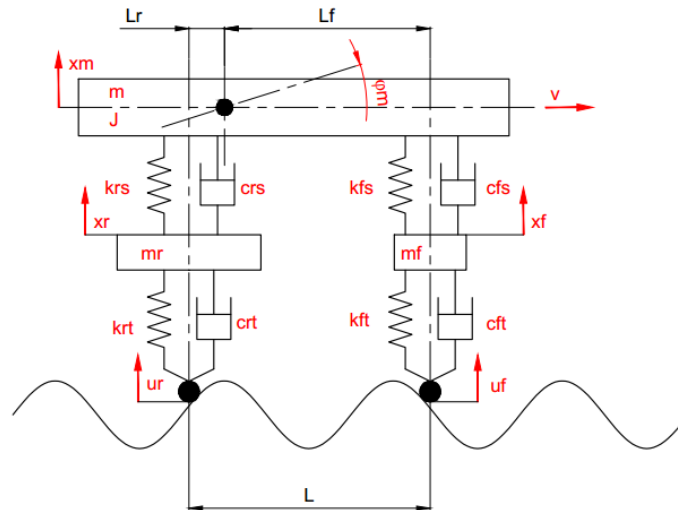


Figure 3.: The used half-vehicle model (by authors)

The equations describing the systems behavior can be determined using Lagrangian equations (Égert, 2006) or free-body diagrams (Horváth, 2006):

$$y_f m_f \frac{d^2 x_f(t)}{dt^2} = F_{kfs} + F_{cfs} + F_{kft} + F_{cft} \quad (1)$$

$$m_r \frac{d^2 x_r(t)}{dt^2} = F_{krs} + F_{crs} + F_{krt} + F_{crt} \quad (2)$$

$$m \frac{d^2 x_m(t)}{dt^2} = -(F_{kfs} + F_{cfs} + F_{krs} + F_{crs}) \quad (3)$$

$$J \frac{d^2 \varphi_m(t)}{dt^2} = bF_{krs} + bF_{crs} + aF_{krt} + aF_{crt} \quad (4)$$

The tire is modelled by a nonlinear spring. The force applied by the tire and the force applied by the suspension leaf spring are approximated by the following equation (Moran & Nagai, 1994):

$$F_k = k_i \cdot \text{sgn}(\Delta u) |\Delta u|^{n_i} \quad (5)$$

where n_i is the nonlinear coefficient of the spring.

The damping force of the shock absorbers is approximated by the following equation:

$$F_c = c \cdot \text{sgn} \left(\Delta \left(\frac{du}{dt} \right) \right) \left| \Delta \left(\frac{du}{dt} \right) \right|^g \quad (6)$$

where g is the nonlinear coefficient. It should be noted that this coefficient may be different in case of expansion and compression, but based on the measured data in (Konieczny et al., 2006) there is no significant deviation in case of some telescopic hydraulic shock absorbers, therefore the same value was used in both cases. The damping effect of the tire was chosen as constant.

Parameter values used for simulations were taken from (Jiao, 2013), where a heavy duty truck was examined. The parameter values can be seen in Table 1.

Table 1.: Parameter values used for simulation

Parameter	Value	unit
m_f	310	kg
m_r	740	kg
m	7200	kg
J	28600	kgm
k_ft	1000000	N/m
c_ft	500	Ns/m
k_fs	200000	N/m
c_fs	20000	Ns/m
n_tf	1.1	
n_sf	1.3	
n_df	2.2	
k_rt	1800000	N/m
c_rt	1000	Ns/m
k_rs	400000	N/m
c_rs	40000 (tension)	Ns/m
n_tr	1.1	
n_sr	1.45	
n_dr	2.2	
a	3.486	m
b	0.613	m

The road profile was assumed to be sinusoidal (Figure 4).

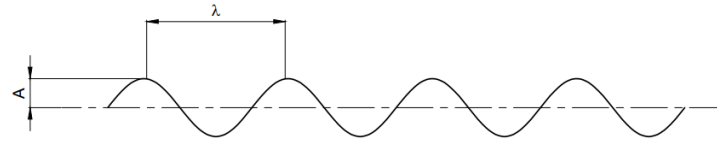


Figure 4.: Sinusoidal road profile (by authors)

From the road profile the input excitation signals can be defined from which are:

$$x_f(t) = A \cdot \sin(\omega t) \quad (7)$$

$$x_r(t) = A \cdot \sin(\omega t - T_d \cdot \omega) \quad (8)$$

where ω is the rotational speed, T_d is the time delay (Barbosa, 2011). Rotational speed depends on the velocity of the vehicle and λ wavelength (it can be 10 μ m-100 m depending on the characteristics of the road (Dixon, 2009).

$$\omega = \frac{2\pi v}{\lambda} \quad (9)$$

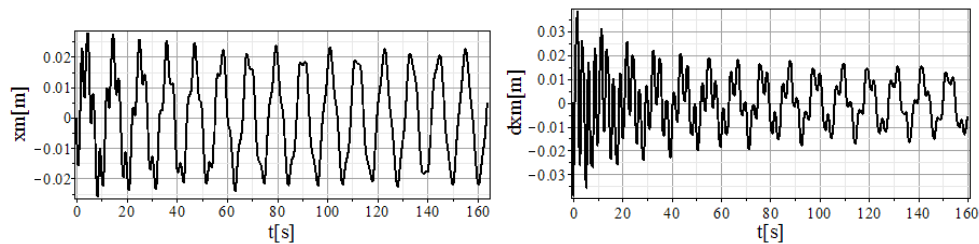
$$T_d = \frac{4.2}{V} \quad (10)$$

Parameters λ was chosen 30 m and amplitude A was chosen 0.02 m, which is the profile of an undulated road (Dixon, 2009). Velocity was 10km/h (offroad), 50 km/h (urban roads) and 110 km/h (motorway).

Simulation results

The simulation was carried out with Maple. The vibrations of the centre of mass (vehicle body) was examined. Time diagrams, phase-plane diagrams, Poincaré sections and frequency spectrum diagrams were created with numerical simulations.

The results of the simulations can be seen in Figure 5-Figure 7.



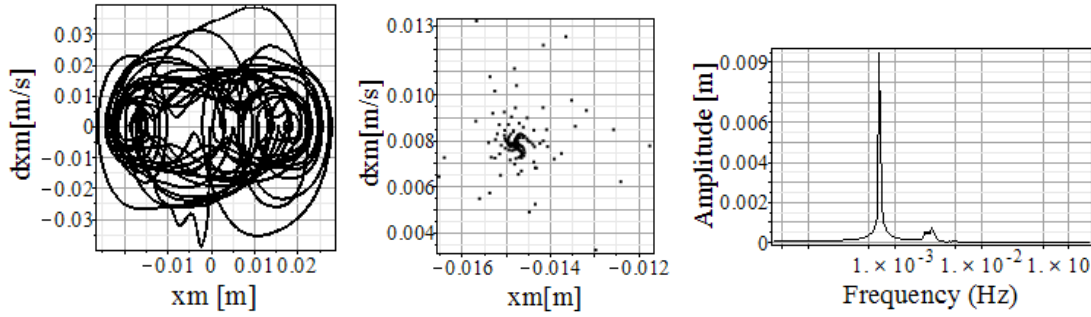


Figure 5.: Time diagrams, phase-plane diagram, Poincaré section and frequency diagram in case of $V=10$ km/h (by authors)

If $V=10$ km/h chaotic oscillation can be observed on time and phase-plane diagrams. On the Poincaré section a chaotic attractor can be seen. On the frequency diagram it can be seen that there is a main frequency component and a smaller chaotic component.

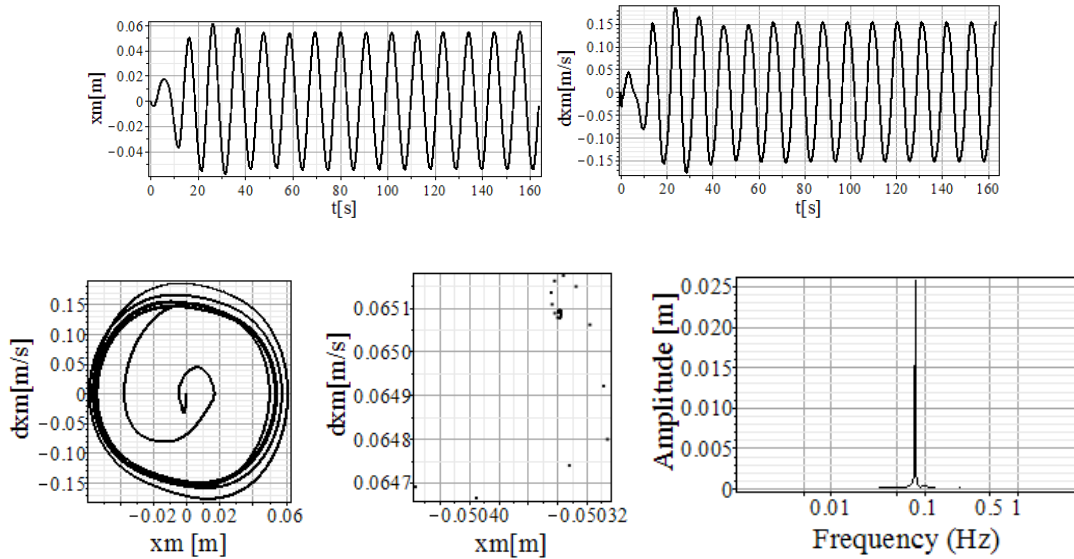
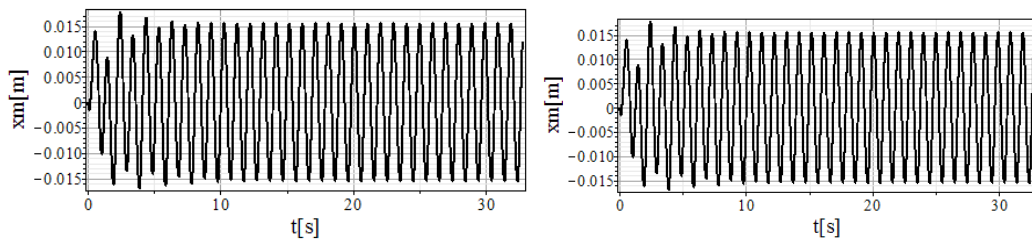


Figure 6.: Time diagrams, phase-plane diagram, Poincaré section and frequency diagram in case of $V=50$ km/h (by authors)

If $V=50$ km/h there is a harmonic oscillations with a small amplitude transient chaos, which can be seen on the Poincaré section.



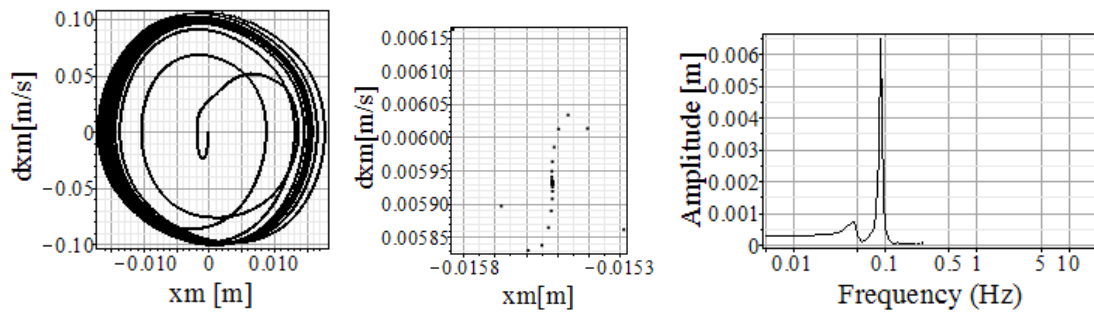


Figure 7.: Time diagrams, phase-plane diagram, Poincaré section and frequency diagram in case of $V=110$ km/h (by authors)

In case of $v=110$ km/h a chaotic limit cycle can be seen on the phase-plane diagram. On the frequency diagram there is a small amplitude chaotic component. The effects of microchaos is further research task.

Conclusions and further development

The chaotic vibrations that can emerge during the operation of a special fire truck were examined in this study. It was shown that harmful chaotic vibrations, which can damage the structural elements of the vehicle and some of the built-in and carried equipment may occur with certain operating parameters. The vibrations of the vehicle were tested in three different speed ranges. Steady, transient and micro chaos all can occur according to the simulation. With our research results, we want to draw attention to the importance of the topic and the consequences of the chaotic vibrations. The presented results identified further research directions. In the future simulations with real road profiles and measured spring and shock absorber characteristics will be carried out. The effects of road failures (e.g. potholes and bumps) and extreme operation conditions (e.g. acceleration-braking, steady position during fire-fighting) will be simulated. The proposed model will be expanded with the vehicles own vibrations (e.g. engine) and the fluid movement in the water tank. Our aim is to discover the cases which will result in harmful vibrations and to determine their security risks.

Acknowledgements



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Comparison of ARIMA Time Series Model and LSTM Deep Learning Algorithm for Bitcoin Price Forecasting

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Abstract

In this study, ARIMA Time Series Model and the LSTM Deep Learning Algorithm have been compared to estimate the future price of Bitcoin. The ARIMA model, which is widely used in the prediction of time series, is run in the R programming language. The LSTM model, which is the machine learning algorithm used in predicting the time series, is also built using the Keras framework in Python. The prices of the next 30 days were estimated with the obtained models. The results have been obtained approximately MAPE 11.86% with ARIMA and MAPE 1.40% with LSTM. Also according to other accuracy test results, it is observed that the LSTM Model is more successful when the results are compared.

Keywords: Bitcoin, time series, deep learning, forecasting, ARIMA

Main Conference Topic: Computer Science, Artificial Intelligence

Introduction

Bitcoin has been proposed as an electronic payment system based on mathematical proof and cryptographical method by a mysterious software developer going by the name of Satoshi Nakamoto in 2008 (Nakamoto, 2008). The system can work independently of any central authority. Money can be transferred electronically in secure, provable and immutable. Bitcoin became one of the first digital currencies to use the decentralized network to promote instant payments after Satoshi's paper. Although Bitcoin was not designed as an investment, many people purchase Bitcoin and cryptocurrencies on exchanges for investment. Today, Bitcoin can be traded on over 40 exchanges worldwide. Market size reached about 11 billion dollars in April 2018 (<https://coinmarketcap.com/charts/>). The price of Bitcoin is far higher than of fiat currencies. This potential requires forecasting the future price of Bitcoin. The latest price of Bitcoin (currency symbol: BTC or XBT) can be found on the exchanges. Closing prices for any period (a month, a week, a day, one hour, etc.) are used to obtain price graphics. Bitcoin prices graph of 2013-2018 years has been shown in Figure 1. The daily closing prices were obtained from bitcoin.com (Bitcoin launched in 2009. But there are no data on exchanges before 2013).



Figure 1: Bitcoin price of 2013-2018 years (bitcoin.com)

Time series concern data that has been obtained over time. Therefore, Bitcoin prices can be accepted as a time series. Time series forecasting applies in many practical fields such as business, economics, finance, and engineering, etc. Many researchers show neural networks are one of the most successfully applied technique in the financial forecasting problems (Gallo, 2005), (Bodyanskiy, & Popov, 2006), (Navon, & Keller, 2017), (Xiong et al., 2015), (Fischera, & Kraussb, 2017). Time series prediction models and machine learning models are used to estimate Bitcoin prices. Madan et al. (2014) have predicted the sign of the daily price change with an accuracy of 98.7% by using machine learning algorithms. Georgoula et al. (2015) used time-series analysis to study the relationship between Bitcoin prices, and Twitter feeds by using Support Vector Machine (SVM) Algorithm. Jang et al. (2018) revealed the effect of Bayesian neural networks (BNNs) by using the time series of Bitcoin process. The theoretical framework for time series analysis and real-time algorithms for Bitcoin price prediction have been developed by Amjad, & Shah (2016). Abu Bakar et al. (2017) implemented the forecast ARIMA (2, 1, 2) model by using monthly Bitcoin price data and obtained mean absolute percentage error for forecasting is 5.36%.

According to related works, ARIMA time series forecast model and LSTM deep learning algorithms are convenient for forecasting Bitcoin price.

Methodology

Two prediction models have been proposed using by R and Python Keras to compare time series ARIMA model and LSTM deep learning algorithm.

Data Set

The data set consists of Bitcoin price sampled at daily between April 28, 2013 and October 29, 2017 (source: www.quandl.com). 1646 daily Bitcoin prices have been used for training. The obtained models predict Bitcoin prices for next 30 days.

Used Technology

R has been created as a language and platform for statistical computation and graphics. R is an integrated suite of software tools for data manipulation, calculation, and graphical display. R allows performing time series analysis using interactive mode or programming (Coghlan, 2017). "forecast", "ggplot2", and "tseries" R libraries have been used for creating

ARIMA model in this study. Keras deep-learning library has been built on Python. It has minimalist API to build Deep Learning models easily (Chollet, 2015).

ARIMA Model

ARIMA model is a type of statistical models for forecasting time series data (Box, & Jenkins, 1970). Non-stationary time series is made stationary by using finite differencing of the data in ARIMA models. ARIMA is an acronym that represents AutoRegressive Integrated Moving Average.

- **AR** (Autoregression): The dependent relationship between observation and some number of lagged observations.
- **I** (Integrated): The use of differencing of raw observations to obtain the time series stationary.
- **MA** (Moving Average): The dependency between an observation and a residual error from a moving average model used to lagged observations.

ARIMA(p,d,q) is a standard notation that depicts the integer value parameters to indicate the ARIMA model. The parameters of the ARIMA model are represented as follows:

- p: The number of lag observations.
- d: The number of times that the raw observations are differenced.
- q: The size of the moving average window.

The full mathematical model can be written as:

$$y'_t = c + \phi_1 y'_{t-1} + \dots + \phi_p y'_{t-p} + \theta_1 \varepsilon_{t-1} + \dots + \theta_q \varepsilon_{t-q} + \varepsilon_t \quad (1)$$

where y'_t is the differenced series (Hyndman, & Athanasopoulos, 2012). It is much easier to work with the backshift notation to combine components. (1) can be written in backshift notation as:

$$(1 - \phi_1 B - \dots - \phi_p B^p) (1 - B)^d y_t = c + (1 + \theta_1 B + \dots + \theta_q B^q) \varepsilon_t \quad (2)$$

It can be difficult to choose appropriate values for p, d, and q. However, the `auto.arima()` function in R will do it automatically.

Kwiatkowski-Phillips-Schmidt-Shin (KPSS) unit root test has been used to check stationary. The null hypothesis is that the data are stationary. In this case, small p-values (e.g., less than 0.05) suggest that difference is required (Hyndman, & Athanasopoulos, 2012).

Following steps has been introduced to create ARIMA model.

Proposed Process ARIMA Model:

- Step 0.** Load data set and libraries
- Step 1.** Create time series data
- Step 2.** Check stationary
- Step 3.** Check seasonality
- Step 4.** Obtain ARIMA model

Step 5. Create forecast model

Step 6. Create train data and test data

Step 7. Test accuracy results

Proposed ARIMA Model has been run using by R. R sources codes and outputs have been shown below:

Step 0. Load data set and libraries

```
> library(forecast)
> library(ggplot2)
> library(tseries)
> library(readr)
> btc_usd_daily <- read_csv("btc_usd_daily.csv")
```

Step 1. Create time series data

```
> BTC <- ts(btc_usd_daily, frequency=365)
```

Step 2. Check stationary

```
> kpss.test(BTC)
> autoplot(BTC)
```

KPSS test computed p-value = 0.01. This result shows that data set is not stationary (Figure 2).

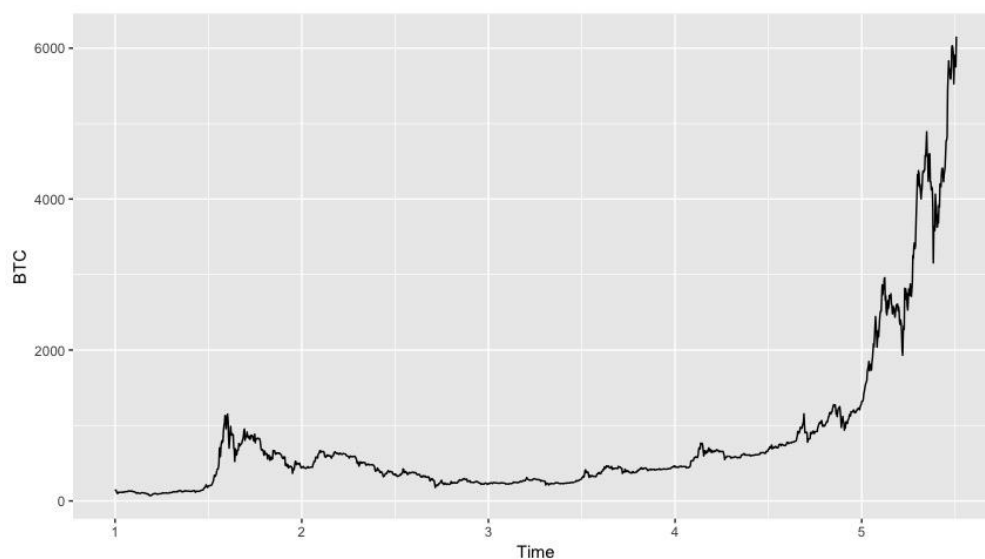


Figure 2: BTC price graph

Step 3. Check seasonality

```
> Test_Seasonal <- tbats(BTC)
> Seasonal <- !is.null(Test_Seasonal$seasonal)
> Seasonal
[1] FALSE
```

Step 4. Obtain ARIMA model

```
> Fit<-auto.arima(BTC, seasonal=FALSE,
stepwise=FALSE, approximation=FALSE, trace=TRUE)
> Fit
```

```
Series: BTC
ARIMA(4,2,1)
Coefficients:
      ar1      ar2      ar3      ar4      ma1
      -0.0391 -0.0138  0.0034 -0.0745 -0.9899
s.e.      0.0251  0.0251  0.0252  0.0251  0.0036
sigma^2 estimated as 3465:  log likelihood=-9032
AIC=18076.01  AICc=18076.06  BIC=18108.44
> tsdisplay(residuals(Fit),lag.max=32, main="(4,2,1) Model Residuals")
```

ARIMA(4,2,1) is obtained model by computing auto.arima() function. This model will be used as a Fit. Obtained ARIMA(4,2,1) Model result has been shown in Figure 3.

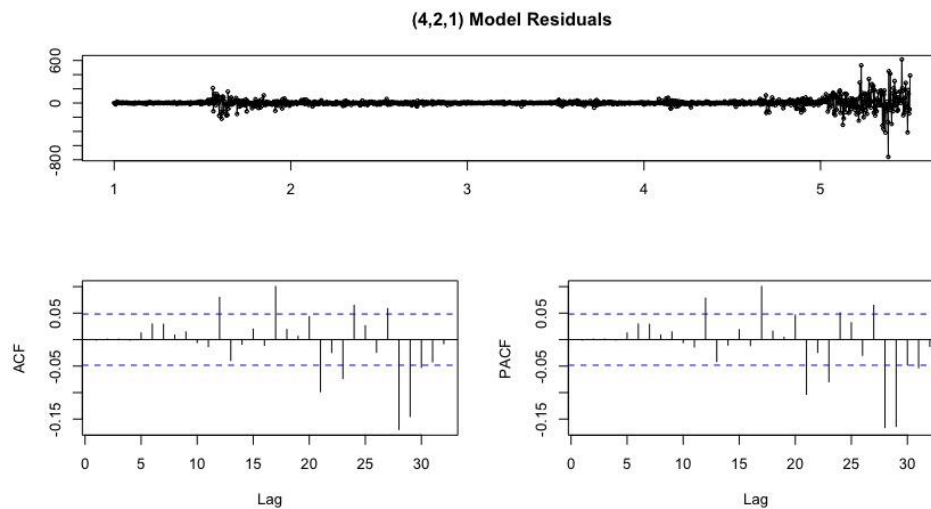


Figure 3: ARIMA(4,2,1) Model residuals, ACF and PACF graphics

Step 5. Create forecast model

```
> Forecast_30 <- forecast(Fit,h=30)
```

Forecast_30 includes BTC price for next 30 days (between October 30, 2017 and November 30, 2017). The minimum price is \$6156.963 and maximum price is \$6926.424. Prediction prices for next 30 days have been shown in Figure 4.

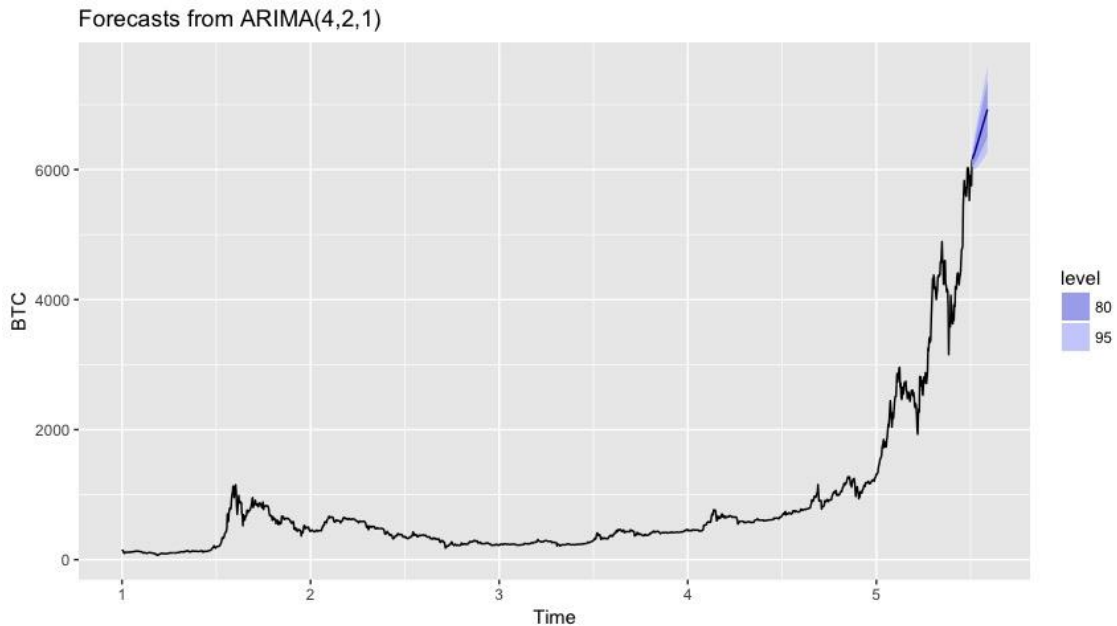


Figure 4: Prediction prices of next 30 days

Step 6. Create train data and test data

```
> Traindata <- data.frame(Forecast_30)
> Traindata <- Traindata$Point.Forecast
> Testdata <- c(6158.76, 6115.15, 6411.84, 6694.38, 7069.03, 7199.62,
7369.08, 7400.39, 7025.14, 7167.19, 7447.27, 7154.71, 6622.42, 6368.32,
5852.81, 6527.20, 6714.17, 7280.20, 7814.49, 7738.42, 7833.45, 8012.64,
8225.41, 8132.54, 8260.71, 8054.45, 8239.31, 8706.60, 9207.99, 9713.31)
```

Testdata includes real Bitcoin prices on between October 30, 2017 and November 30, 2017.

Step 7. Test accuracy results

```
> accuracy(Traindata, Testdata)
      ME      RMSE      MAE      MPE      MAPE
Test set 880.0015 1146.067 939.5819 10.86483 11.86484
```

R function accuracy shows some accuracy tests. It means ARIMA(4,2,1) model can predict prices by approximately 11.84% error.

LSTM Deep Learning Algorithm

Deep Learning (DL) is a part of machine learning (also known as deep structured learning or hierarchical learning). DL is based on a set of algorithms that attempt to model high-level abstractions in data by using multiple processing layers composed of multiple non-linear transformations. LSTM Deep Learning algorithm, developed by Hochreiter and Schmidhuber (1997), allows the preservation of the weights that are forward and back-propagated through layers. The network can continue to learn over many time steps by maintaining a more constant error. Thus, the network can be used to learn long-term dependencies. An LSTM cell contains the forget and remember gates which allow the cell to determine what information to prevent or pass based on its strength and importance. Adam optimizer is an excellent general-purpose optimizer that performs our gradient descent via backpropagation through time (Kingma, & Ba, 2014). The Rectified Linear Unit (ReLU) has

become very popular in deep learning process. It computes the function $f(x)=\max(0,x)$ (Nair, & Hinton, 2010).

Daily prices have been used as input values in LSTM deep learning algorithm. ReLU as an activation function and Adam as an optimizer function have been chosen for the model. Obtained Process LSTM Model has been shown Figure 5.

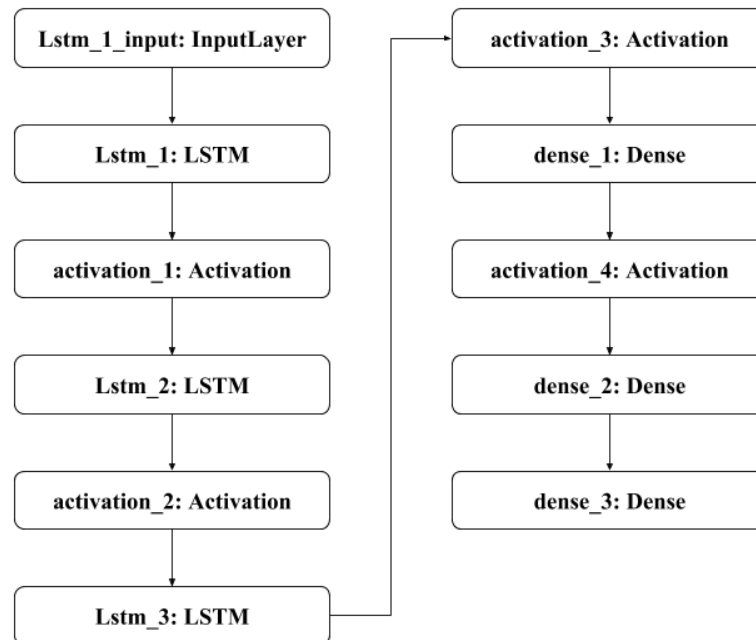


Figure 5: LSTM deep learning output model for prediction Bitcoin price

LSTMs are sensitive to the scale of the input data. The data has been rescaled to the range of 0 to 1, also called normalizing. The model has one output to predict price. 30 days data have been used to predict next days prices.

The model has 3 LSTM and 2 hidden layers between input and output layers. First LSTM layer has 64 neurons which are fully connected with input layers. Second and third LSTM layers have 128 neurons. ReLU activation function has been applied to all LSTM layers. A hidden layer which has 128 layers follow the third LSTM layer. Between the third LSTM layer and hidden layer, ReLU activation function has been applied. The second hidden layer has 64 neurons. Between the first and second MLP layers, ReLU activation function has been applied. Output layer follows the second MLP layer. There is no activation function between second MLP and output layers. Adam optimization function has been used in this study. Learning rate has been determined as “0.001”. All learning processes have been run in 1000 epochs. Obtained model has predicted Bitcoin price in next 30 days by 1.4% error.

Results

A few essential performance measures which are frequently used by researchers have been described below (Adhikari, & Agrawal, 2013).

$$\begin{aligned} \text{MAE (The Mean Absolute Error)} &= \frac{1}{n} \sum_{t=1}^n |e_t| \\ \text{MAPE (The Mean Absolute Percentage Error)} &= \frac{1}{n} \sum_{t=1}^n \left| \frac{e_t}{y_t} \right| 100 \\ \text{MPE (The Mean Percentage Error)} &= \frac{1}{n} \sum_{t=1}^n \left(\frac{e_t}{y_t} \right) 100 \\ \text{RMSE (The Root Mean Squared)} &= \sqrt{\frac{1}{n} \sum_{t=1}^n e_t^2} \end{aligned}$$

These measures have been used to compare the results for ARIMA Model and LSTM Model. Table 1 depicts all results for models. LSTM Model was successful for all result of the tests.

Table 1: Comparison of accuracy tests for obtained ARIMA model and LSTM deep learning model.

Model	RMSE	MAE	MPE	MAPE
ARIMA(4,2,1) Model	1146.07	939.58	10.86	11.86
LSTM Deep Learning Model	93.27	81.56	1.40	1.40

Conclusion

Bitcoin prices data is a time series. Forecasting the future price of Bitcoin is very important for investors. ARIMA model as a statistical model and LSTM deep learning algorithm as a machine learning have been used for forecasting Bitcoin prices data. The results have been obtained using proposed ARIMA model process with R and using proposed LSTM deep learning model process with Python. LSTM Model computed predict price by 1.4% error. The results show machine learning techniques are convenient for future prediction price of Bitcoin.

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Fabrication of a novel material: EPS/Chopped E-Glass/Epoxy Hybrid Composite

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Abstract

This paper represents the fabrication study of a novel material which is a combination of chopped E-glass, expandable polystyrene (EPS) and epoxy resin. The material is a novel hybrid material which can be used for different purposes. In the study, silane-treated chopped E-glass fibers were mixed with EPS beads in different ratios and fabricated with resin transfer molding method in laboratory scale. The material has promising characteristics and can be used for different purposes especially in automotive applications. The material has $102,04 \pm 19,16$ HV1 (1kgf – 9.806 N) micro-hardness value under 20 seconds dwelling time and the water absorption of the material 2,485% in 240 hours (by weight) as maximum and the average water absorption was 1,246% for all specimens. Another important result of the material is the quasi- homogenous structure which is not generally possible with particulate reinforced materials. This hybrid material combines the properties of both discontinuous glass fibers and EPS beads particulates. The material promises low cost by combining the glass fibers and EPS beads.

Keywords: Hybrid, Composite Fabrication, Epoxy, E-glass, EPS

Main Conference Topic: Engineering

Propolis Cream Addition to Methyl Methacrylate Based Dental Composite for Achieving Smoother Surface

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Abstract

Methyl methacrylate compound is a widely used polymer composite for restorative and esthetic teeth treatments. In this study, cream obtained from a natural material propolis was added to methyl methacrylate (EsFlow light curing flowable-composite dental resin) and roughness profiles were evaluated experimentally. The aim of the study was to obtain smoother surface by adding cream for surface modification. Two groups of specimens were prepared which are methyl methacrylate group and propolis cream added (0,14% by weight) group. The higher density of propolis cream slightly increased the density of propolis added group specimens compared to methyl methacrylate group. Due to the similar color of the propolis cream a significant change in specimen was not observed with eye. The specimens were cured with LED light curing unit (Liangya CE 0197). The all specimens were tested before and after polishing. Two different abrasive discs were used for polishing which contains aluminum oxide and silicon carbide. As a consequence, the propolis cream added group had smoother surface after polishing compared to methyl methacrylate group for both polishing materials. Polishing with aluminum oxide also resulted with smoother surface for both test groups.

Keywords: Methyl methacrylate, Polishing, Roughness, Surface Modification.

Main Conference Topic: Engineering

The Connection between Motivation and Behaviors

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Abstract

This preliminary study reports a possible connection between the motivation to participate in physical activity (PA) and actual PA behaviors. Motives for participating in physical activity were assessed through a questionnaire (MPAM-R) and were used to measure motives to participate in PA. Two groups of university students with the same major (kinesiology/healthy lifestyle) from two different countries took the questionnaire and a multivariate analysis of variance (MANOVA) revealed a significant difference between the two groups in their motives for participating in physical activity, Wilks' $\lambda = .78$, $F(5, 69) = 3.79$, $p = .004$, partial $\eta^2 = .22$. Also, the group with the lower motivation to participate in PA were significantly younger ($p < .01$), had lower BMI ($p = .02$), had higher PA measured with pedometers ($p < .01$). The results suggested that higher motivation to participate in PA measured by MPAM-R not be enough to influence PA behavior positively.

Keywords: PA - any sport and exercise, motivation - the driving force behind action, behavior - a manner of acting, obesity.

Main Conference Topic: Health Education

Introduction

Reliable research data show an increased incidence of corpulence and obesity among adult populations of developed and some developing countries and the alarming spread of the problem. For example, in 2012 one-third of adults were overweight in the United States (Ogden et al., 2013) and the World Health Organization estimates roughly 39% of adults worldwide aged 18 and over as overweight with the incidence of obesity doubling since 1980 (WHO, 2016). Causes of this growing epidemic are a well-known combination of improper diet and sedentary lifestyle. The most widely used indicator of obesity and overall health in individuals is the body mass index (BMI). Health-related quality of life (HRQL) and BMI have an inverse relationship, and individuals with a higher BMI tend to have a lower health-related quality of life (Lillis et al., 2011). It has also been reported that people with a BMI of 30 or higher that classified them as obese were more likely to have many psychosocial difficulties in addition to a poorer overall quality of life (Hackman and Mintah, 2010).

To understand what drives the primary behavior for people to be more physically active and to appreciate the benefits of PA could be a critical factor in changing the unwanted obesity trend that is connected to many health problems in addition to reduced mental performance (Kilpatrick et al., 2005; Hackman and Mintah, 2010). Reasons to be PA may vary for different cultures and different age groups. Ziegler (2000) and Duda and Hayashi

(1998) in their studies expressed a need for more cross-cultural research and comparative studies to understand different cultures better. Also, Keating et al. (2005) stressed the need to study college students because PA for this age group is decreasing and that “virtually all college students are adults with multiple responsibilities and they are very likely to maintain physical activity patterns that they establish during their college years throughout adulthood” (p.117). Furthermore, in the fall of 2016, some 20.5 million students attended American colleges and universities; therefore, to be able to influence this large group would be very beneficial (U.S. Department of Education Institute of Education Sciences National Center for Education Statistics, 2016). In general, it has been understood that when people are motivated to do something, the results of that task are much better when compared with those who are not motivated (Lazear, 2000; Kusurkar et al., 2013). Motivation has been described as the driving force behind the action (Deckers, 2010): A higher motivation to participate in PA should move people to action with a resulting change of their sedentary behavior and become interested in understanding the benefits of PA. It is hypothesized that this should happen to a higher degree for university students who major in kinesiology/healthy lifestyle.

History of Motivational Theories

Early motivational theories were often based on the work of behavioral psychologists such as Pavlov and Thorndike, and focused on the concept of maintaining homeostasis: Within these theories, all human behavior was seen as motivated by an innate need for balance. Hull's (1943) Drive-Reduction Theory (DRT) was the first to create one central theory that could be used to explain and understand all aspects of human behavior. The DRT was later modified by Abraham Maslow with his theory of Human Motivation. Maslow proposed the idea that individuals are motivated to perform behaviors to fulfill each need starting with lower order and moving toward higher order. As one need was fulfilled, the next need in the hierarchy would then become the primary focus of motivation. Maslow also proposed that the motivation to fulfill these needs could be derived from both internal and external forces (Maslow, 1954). In 1957, Atkinson proposed the Theory of Achievement Motivation. The Theory of Achievement Motivation is the first theory to recognize that the level of motivation to perform specific tasks will vary between individuals because of differences in personalities. In the 1990's, Deci and Ryan (1990) developed a new theory named Self-determination Theory (SDT) from decades of research related to the topic. The theory is based on the idea that each individual has desires to attain self-fulfillment and to achieve personal growth.

In summary, prior theory and research were not conclusive; however, they have indicated some relationships between motivation and PA behavior. To get a better understanding of this relationship, explicitly involving university students from two different countries that chose kinesiology/healthy lifestyle as their major subject of study we asked two research questions: (1) Are there any differences in motivation to participate in PA between two groups of students with the same major (kinesiology/healthy lifestyle) in two universities in two countries?; (2) Do possible differences in motivation to participate in PA affect PA behavior as measured by BMI and level of PA?

Theory and Methods

Participants

A total of 76 American (n=46) and Czech (n=30) college students enrolled in their first major class kinesiology/healthy lifestyle participated in the study. Representative sampling technique was used to match the same students' characteristic (first major class and same major of study). Because the study was directly connected to the participants' major,

the PA behavior and their knowledge about the benefits of PA were collected as a part of the class session in both countries. Before participating in the study, all participants provided their informed consent form where they agreed to participate, and the study was approved by the Institutional Review Boards in both countries.

Measures and Statistical Analysis

The study relied on self-reporting as well as self-monitoring assessment techniques. The first research question “Are there any differences in motivation to participate in PA between two groups of students with the same major in two different universities in two countries?” was assessed using the previously validated instrument MPAM-R (Ryan et al., 1997). This instrument was developed to assess the strength of both intrinsic motivation (competences, interest/enjoyment and social motives) and extrinsic motivation (appearance and fitness) for participating in physical activities. Questions such as reasons for engaging in PA “because it’s fun” or “because I want to obtain new skills” are scored on a Likert type scale from 1 “not at all true for me” to 7 “very true for me”.

The second question “Do possible differences in motivation to participate in PA affect PA behavior as measured by BMI and level of PA?” was assessed by measuring students’ BMI and by using a pedometer to count steps. The BMI is an important factor when considering PA because people who are obese are usually not physically active. Kruger et al. (2007) in their study on health-related quality of life (HRQL) and reported that HRQL is more commonly low among obese individuals when compared with people with a healthy weight. Jia and Lubetkin (2005, p. 160) found that “persons who were physically active not only had a lower risk of being obese but also had higher HRQL scores at all BMI levels.” The studies that report a relationship between BMI, HRQL and PA, support that if people live healthy lifestyles, they are more likely to have a higher quality of life. The use of pedometers to assess and predict PA levels has been a frequent practice for many years. Some studies suggested that to assess and predict PA, the adult participants could wear the pedometers less than one week (Sigmundova et al., 2013; Tudor-Locke et al., 2005). For our study, however, we chose to assess the number of steps taken during a full week period excluding time for sleep and personal hygiene. For measurement-accuracy, both groups of students used the same type of pedometers YAMAX SW 701 (Schneider et al., 2003; Simunek et al., 2016) and started recording their measurements on the same date (Monday-Sunday).

Procedures

All data were collected in English because the Czech university students have English as a second language and English is required and taught in primary school. Furthermore, the two questionnaires used simple English with familiar words especially for students who study the same major (kinesiology/healthy lifestyle). Some of the English words are commonly used in the Czech language, and many times are not translated in the professional literature. For example, the terms physical activity, physical fitness, muscles, BMI, carbohydrate, protein, fat, energy, heart rate, and calories, are used in both English and Czech academic texts and journals, so no translation of these was required.

Results

To examine research Question 1, a one-way multivariate analysis of variance (MANOVA) was conducted. The results revealed a significant difference between the two groups in their motives for participating in physical activity, Wilks’ $\lambda = .78$, $F(5, 69) = 3.79$, $p = .004$, partial $\eta^2 = .22$. Although the follow up analyses indicated higher composite scores for all five motivating factors (see Table 1), there were no statistically significant differences in the *Interest/Enjoyment* ($p = .73$), *Competence* ($p = .07$), or *Social* ($p = .92$) factors. The U.S. students did score statistically significantly higher for the *Appearance* ($p = .03$) and

Fitness ($p = .008$) factors. The U.S. students mean scores were higher for almost all (29 of 32) of the motivation questions when compared with the Czech students. However, independent t-test analyses only found statistically significant higher scores for U.S. students with regard to external motivation for the *Appearance* factor, with the following items: “I want to look or maintain weight so I look better” ($t = 2.92$, $df = 73$, $p = .005$), “I want to be attractive to others” ($t = 2.28$, $df = 73$, $p = .026$), “I want to improve my appearance” ($t = 2.57$, $df = 73$, $p = .012$), and “I want to improve my body shape” ($t = 2.3$, $df = 73$, $p = .024$). Within the extrinsic *Fitness* factor, the following items were statistically significantly higher: “I want to have more energy” ($t = 3.0$, $df = 73$, $p = .004$), “I want to improve my cardiovascular fitness” ($t = .369$, $df = 73$, $p < .001$), and “I want to maintain my physical health and well-being” ($t = 2.3$, $df = 73$, $p = .024$). The only other item that was statistically significantly different between the Czech and U.S. students was in the intrinsic *Competence* factor. The US students scored “I like activities which are physically challenging” higher than the Czech students ($t = 1.96$, $df = 73$, $p = .05$).

Table 1: Group Means and Standard Deviations for Motivating Factors to Participate in Physical Activity

Motivating Factors	Czech Students ($n = 30$)		US Students ($n = 45$)		<i>p</i> -value
	M	SD	M	SD	
Interest/Enjoyment (intr.)	5.29	1.33	5.41	1.36	.73
Competence (intr.)	4.92	1.29	5.51	1.36	.07
Appearance (extr.)	4.86	1.82	5.67	1.48	.03
Fitness (extr.)	5.26	1.45	6.12	1.27	.01
Social (intr.)	4.15	1.47	4.18	1.62	.92

To address research Question 2, first, we were interested to see if student’s age, gender, and country were related to differences in BMI and PA levels using ANOVA and regression analyses. There were statistically significant differences in BMI and age when comparing the students from each country ($p < .05$). The US students had a statistically significantly higher BMI of 24.4 than the Czech students BMI of 21.5 ($p = .02$, $\eta^2 = .07$). The U.S. students also were statistically significantly older ($M = 21.4$, $SD = 2.1$) than the Czech students ($M = 20.2$, $SD = 1.5$) at the $p = .01$ level. Of note, the range for U.S. students was from 19 years old to 31 years old compared the range for Czech students from 18 years old to 26 years old. No effects were found for gender when looking at either the BMI. For this study, steps recorded on pedometers were used as a proxy for PA levels. The Czech Republic students reported an average of 20,251 more steps than students in the US. An independent t-test revealed this to be statistically significant ($t = 3.05$, $df = 65$, $p < .01$) with a moderate-to-large .75 Cohen’s d effect size (Cohen, 1988).

Discussion

The Czech students were on average younger than the students from the U. S. The primary reason for this difference could be the differences in the university education systems. The Czech university system is a socialized based system that is supported by the government as compared to the U. S. based system that relies heavily on students’ tuition even among public universities. In Czech, to gain access to the university is more competitive

(only a limited amount of spaces for certain degrees - free education), and most of the students enter the university immediately after the high school. In the U.S., some students come to the university later in their lives (nontraditional students).

The primary purpose of the study was to examine whether possible differences in motivation to participate in PA between these two groups would influence students' PA behavior (as measured by their BMI and the number of steps recorded by pedometers). The collected data suggested that there were significant differences in motives to participate in PA between these two groups. College students from the southeastern United States were indicated that they were significantly more motivated to participate in PA than students from the southeastern Czech Republic. The college students from the southeastern United States reported higher motivation on almost all 30 questions except three questions. The only three questions where the Czech students scored higher involved intrinsically motivated questions and were not statistically significant. From the remaining 27 questions, the United States students scored higher. Eight of them were statistically significant; however, only one of the eight questions (question 14) was an intrinsically motivated question. All of the remaining seven questions were extrinsically motivated questions (Questions 5, 13, 16, 17, 20, 23, and 24).

When we examined the five MPAM-R factors, we found U.S. students to have higher composite scores for *Fitness* and *Appearance*. However, the main finding of the study was that significant differences in motivation to participate in PA between the two groups did not influence PA behavior and the students' knowledge about their subject of study- kinesiology/ healthy lifestyle. Although the U.S. students reported significantly higher motivation to participate in PA, their BMI was significantly higher ($p = .02$) with moderate effect size ($\eta^2 = .07$) than the BMI of the Czech students and the U.S. students reported significantly lower steps measured by pedometers ($p < .01$) than the Czech students.

Prior research has suggested that when people are motivated to do something, the results of that task are much higher than when they are not motivated (Lazear, 2000; Kusrkar et al., 2013). One possible explanation for the lack of relationship between motivation to participate in PA and the actual PA behavior could be that almost all questions (except question 14) that U.S. students answered statistically significantly higher than the Czech students were the extrinsically motivated questions (5, 13, 16, 17, 20, 23, and 24). Extrinsic motivation refers to engaging in behaviors to elicit external rewards or other contingencies derived from performing the behavior itself. Frederick and Ryan (1993) used an earlier version of the same instrument (MPAM) and found that extrinsic body-related motives "were negatively correlated with hours per week of participation and length of workouts" (p. 125-145.). Other studies corroborate the Frederick and Ryan (1993) findings and suggest that extrinsic, body-related motives (appearance and fitness) are not sufficient to sustain regular exercise regimens and that intrinsic motives are more effective for participating in PA (Ryan et al. 1997; Teixeira et al., 2012). Furthermore, the three questions the Czech students answered higher (but not statistically significantly higher) were all intrinsically motivated questions (6, 7 and 22). Findings from this study support earlier research and indicate extrinsic motivation has little to no relationship to participation in PA. Other researchers (Edmunds et al., 2006) have disagreed with the importance of intrinsic motivation. They suggest extrinsic motivators to be the driving force behind behavior and suggest extrinsic factors may lead to greater PA participation compared to intrinsic motivators. Our study did not support this.

Conclusion

Although Deckers (2010) suggested that motivation is the driving force behind the action, this study suggests that higher motivation by itself (measured by MPAM-R) is not related to higher levels of PA behavior. More research is needed to understand how motivation and specifically internal and external motivational forces may or may not influence behavioral changes that relate to higher participation in PA. To understand what motivates people, and how motivation may change behavior can be useful not only in health education but sociology, psychology, and many other subjects. .

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Assessment of Students' Views of Nature of Science in the Context of the Discovery of DNA Structure

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Abstract

A multi-dimensional nature of science (NOS) instrument based on the story of the discovery of DNA structure had been developed to assess the NOS views of university students in Hong Kong. Using confirmatory factor analysis with LISREL, three NOS scales each with two sub-scales were identified: scientific inquiry (SI: scientific methods, and creativity), scientific community (SC: collaboration and competition, and ethics), and scientific knowledge (SK: SK as truth, and limitations of SK). In general the students were found holding informed views, but the understandings of scientific methods and ethics were relatively weak. In multiple linear regression analyses, students' interest in science and personal value of science significantly predicted scores of two sub-scales: scientific knowledge as truth and creativity, after partialling out the effect of three background variables: gender, religion and upper secondary science. In path analyses, creativity and scientific knowledge were found significantly related to upper secondary science directly, or indirectly via interest, efficacy and personal value of science. Students without religion tended to have weaker understanding of the creative nature of science but better on its limitations. This contextual study can provide information of students' views on NOS to instructor for the design of the course curriculum and instruction.

Keywords: Nature of Science, Contextual Survey, Discovery of DNA Structure, Science Education

Main Conference Topic: Science Education, Learning / Teaching Methodologies and Assessment

Introduction

Given the unquestioned importance of nature of science (NOS) in science education all over the world (McComas, & Olson, 1998; NGSS Lead States, 2013), the assessment of NOS, however, has been highly contested (Allchin, 2010; Deng et al., 2011; Lederman et al., 1998). NOS views of students were traditionally assessed by standardized, Likert-type instruments such as Nature of Scientific Knowledge Scale (Rubba, 1977). These standardized instruments were found problematic in that they reflect experts' views rather than students' (Lederman et al., 1998), oversimplify and overgeneralize NOS aspects (Alters, 1997; Chen, 2006), have semantic problems (Aikenhead, 1979; Chen, 2006), and reveal no underlying reasons of the NOS stances (Aikenhead et al., 1987). Moreover, these standardized

instruments presume the uni-dimensionality of NOS by producing a single overall score as the measure of one's NOS views (Tsai, & Liu, 2005).

Some NOS researchers then shifted the assessment methods to qualitative ones, such as Views of Nature of Science (VNOS; Lederman et al., 2002) that uses open-ended questions in couple with interviews. The validity of these qualitative assessments, however, depends heavily on the assessors' knowledge of NOS, sensitivity and skills to probe into one's NOS views, and more importantly, the philosophical perspectives of assessor to interpret the interviewee's responses. This kind of qualitative assessments, though probably more valid than standardized instruments, faces huge challenges in large scale application to compare findings between research projects and countries due to their non-standardized nature and the amount of time and resources needed.

In light of the limitations of qualitative assessments, there were still attempts to develop standardized, quantitative NOS instrument in ways that would avoid the aforementioned problems. A multiple-choice instrument, Views on Science-Technology- Society (VOSTS; Aikenhead, & Ryan, 1992), used empirically derived views of students to replace expert views, but it was criticized for not allowing combination of choices and focusing largely on science-technology-society in the context of Canada (Lederman, et al, 2002). Some multi-dimensional NOS instruments were developed to address the concern of uni-dimensionality (Chen, 2006; Tsai, & Liu, 2005). These instruments had assumed that one's NOS views are not necessarily coherent and unitary but more or less independent for different NOS aspects, thus generating a profile of one's NOS views instead of a single score. These instruments also claimed to have addressed the problems of the traditional NOS instrument: empirically-based, paying due attention to the meanings of words, allowing Likert responses to each answer of a question, and providing reasons for the NOS views.

Despite the above "improvements", these recently developed NOS instruments still fall short of the problem of overgeneralization by using general NOS statements without contexts. It is arguable whether science is a uniform entity that has a "general" nature applying to all of its processes and products (Elby, & Hammer, 2001). General NOS statements in assessment would hardly capture the diverse, nuanced and changing nature of science, and one's responses are likely dependent on the specific scientific stories a person has come across and recalled (Settlage et al., 2005). In a thorough review of NOS research, Deng and others (2011) point out the neglect of context as a major problem of most NOS assessment (e.g. Leach et al., 2000; Sandoval, & Morrison, 2003). Although sometimes contexts are mentioned in some instruments like VNOS - dinosaur extinction and atomic theory, they are used only as "examples" rather than referring to the specific NOS aspects embedded in the contexts. For instance, "After scientists have developed a scientific theory (e.g., atomic theory, evolution theory), does the theory ever change?" (VNOS(C), Ledermen et al., 2002). Or, when specific contexts are being referred to, for instance, theory of dinosaur extinction and atomic model in VNOS, no information is provided for how the theory was developed and challenged, which will definitely influence how a person responds to the question.

Another major problem with NOS assessment pertains to what constitutes "sophisticated" or "informed" views (Deng et al., 2011). Many NOS researchers explicitly or implicitly take constructivist views as informed (e.g. Lederman et al., 2002; Tsai, & Liu, 2005), but it was disputed by other researchers (e.g. Matthews, 1998). Moreover, it is problematic to judge if a particular NOS view is "informed" or not regardless of the contexts

(Clough, 2007; Elby, & Hammer, 2001). Some researchers attempted to shy away from this problem by emphasizing the goal of NOS assessment as description of one's NOS views without judgment (Lederman et al., 2002). But, what are the educational value and implications of knowing one's NOS views along the positivist-constructivist continuum when we are not yet sure which perspective, positivist or constructivist, represents a more informed view? Some contended that the goal of NOS assessment and instruction should not be making students accept particular NOS stances, but developing their capability to justify and argue for their NOS stances (Allchin, 2010), which is called argumentative resource framework (Deng et al., 2011). Even so, would it be possible to judge one's arguments as good or bad without any criteria of "informed" NOS views?

The study is motivated by the foundation course "In Dialogue with Nature" of the General Education Foundation Programme at The Chinese University of Hong Kong which emphasizes learning about the nature of science through great scientific discoveries such as DNA structure and theory of evolution. The course is compulsory to all fresher and thus has profound impact on students' NOS understandings. In view of the aforementioned issues of NOS assessment, this study has developed a contextual, multi-dimensional NOS instrument that avoids as much as possible the problems of the traditional instruments. The NOS views of students will be further analyzed in connection with their background and attitudinal variables. The research questions of the study are:

1. How can NOS views be assessed in specific contexts of scientific discovery?
2. What are the NOS views of university students in Hong Kong?
3. How are their NOS views related to their gender, religion, secondary science study, and attitudes toward in science?

Methods

The subjects of the study were 129 fresh students aged around 17-20 in The Chinese University of Hong Kong. They were all ethnic Chinese and came from different faculties and departments. An instrument was developed to assess their NOS views as well as attitudes toward science: interest, self-efficacy and personal value of science. Students' background information was also obtained: gender, religion, upper secondary science subjects and major programme at the university. Ten percent of the subjects were invited for an individual interview for instrument validation and further exploration of their NOS views.

Instrument Development

Items were developed around the discovery of DNA structure in the 1950s. This scientific story was chosen since it is part of the course content and rich in NOS aspects. Different from the general NOS instrument that NOS aspects are mainly identified from the "consensus" in NOS literature and science reforms documents (McComas et al., 1998), the development of a contextual instrument has first to scrutinize the scientific story for any embedded NOS aspects that are deemed important for science education. This grounded approach aims to make sure the NOS aspects assessed are meaningfully derived from the context.

The story about the discovery of DNA structure was first studied in detail based on multiple reliable sources to ensure its accuracy, including the two books written by Watson himself (Watson, 1968; Watson, & Berry, 2003), journal articles (e.g. Pray, 2008) and credible online resources (e.g. Understanding Science, 2016). The story was found

illuminating in many important NOS aspects, including diverse methods used in scientific inquiry, how scientists compete and collaborate and the nature of scientific knowledge. The specific storylines, the contextual NOS aspects embedded, and the NOS aspects generalized were then delineated (Table 1), based on which the items were written. This process is crucial in the development of contextual instruments since it allows others to trail and validate how the NOS aspects are extracted from the scientific story and translated into assessment items.

Table 1: Storylines and NOS aspects

Storyline of the Discovery of DNA Structure	Nature of Science in Context
<p>The four main scientists working on DNA structure at the time:</p> <ul style="list-style-type: none"> ♦ Crick and Wilkins were physicists; Franklin was a chemist specializing in X-ray crystallography; Watson was a biologist. ♦ Crick and Watson teamed up at Cambridge University, while Wilkins and Franklin formed a team at University of London. 	<p>They had different expertise and worked as teams, which was crucial for their success in discovering the DNA structure. Most scientists today work as teams since they have to rely on the expertise of each other.</p>
<p>What scientists knew about DNA at the time:</p> <ul style="list-style-type: none"> ♦ DNA instead of proteins in the chromosomes is “likely” the genetic materials. ♦ DNA consists of sugar phosphate chains and four kinds of bases (A, T, G, C) stacked up like pancakes. ♦ Number of A always equals to that of T and G equals to C, whereas the ratios of A/G and T/C vary among organisms – Chargaff’s Rules. 	<p>The discovery of DNA structure was based on the findings of other scientists. Science advances in a gradual and cumulative manner through the work of many scientists, rather than a sudden discovery by one scientist out of nothing.</p>
<p>A new technology, X-ray crystallography, was invented to study the structures of molecules in crystals. Wilkins and Franklin were experts in this technology. Franklin later produced a very clear X-ray image of DNA, providing strong evidence for a two-chain, helical structure of DNA. She suggested that the bases were inside the helixes and phosphates outside.</p>	<p>The development of X-ray crystallography was crucial to the discovery of DNA structure. This is an example showing the role of technology in scientific inquiry. DNA structure cannot be directly seen, but was inferred from the X-ray photo. Though the inferences were not 100% certain, they were reliable because of accurate calculations using principles of physics and chemistry.</p>
<p>Due to personal conflicts with Wilkins, Franklin resigned from the University. Wilkins showed Franklin’s X-ray photo to Watson without her knowledge. Watson also obtained Franklin’s “confidential” report to her funding organization. By these, Watson and Crick were more certain about the DNA structure as double helix with bases inside. But they did not acknowledge Franklin’s findings in their paper published later.</p>	<p>Scientific community encourage exchanges of ideas and findings, but obtaining others’ findings secretly is deemed inappropriate. Moreover, the sources of the ideas and findings have to be acknowledged clearly in publications so as to credit the contributions of each scientist. Watson and Crick were later blamed for that.</p>
<p>The last puzzle faced with Watson and Crick was how to pair up the bases inside the two chains to make a smooth, regular double helix. They made paper cuttings of the bases and tried various ways to fit them together. They had tried A-T and G-C pairing, but the base pairs differed in length, making the chains wiggle in and out. A US chemist Donohue happened to visit their lab and suggested that the chemical structures of the</p>	<p>Both Franklin and Watson teams did not conduct controlled experiment to study DNA structure. Franklin made X-ray photos of DNA crystals while Watson team tried out various DNA models with paper cuttings to see if it could make a smooth double helix. It shows that scientists use a variety of methods to investigate. Even the “standard” steps of scientific inquiry- questions, hypothesis, testing and conclusion, are not</p>

<p>bases in the textbooks might be wrong. After his correction, A-T and G-C paired perfectly in the same length. This made the DNA chains twist in a smooth and regular manner.</p>	<p>followed strictly, e.g. Franklin making X-ray photos without a clear hypothesis about DNA structure. Watson and Crick needed creativity and imagination to propose various DNA models to try out, but the models had to fit with the properties of DNA. This shows the role of creativity and logical reasoning in scientific inquiry. Sometimes luck is important in scientific discovery – the visit of Donohue to Watson’s lab. But the help of Donohue meant nothing if Watson and Crick had not spent years in studying the DNA structure. Also, even without Donohue, the base structures would be corrected sooner or later. Luck is neither necessary nor sufficient condition for scientific discovery.</p>
<p>Watson and Crick finally worked out the whole DNA model - a double helix linked up by bases in A-T and G-C pairing. It fitted with all the evidence (e.g. Chargaff’s rules) and also suggested how DNA can carry genetic information (by the order of bases) and replicate itself (by using one chain as the template). This DNA model was well received by other scientists as a “simple and beautiful” model.</p>	<p>The DNA model proposed by Watson and Crick was quickly accepted because it satisfactorily explained all the evidence about DNA. In addition, it can predict how DNA can replicate itself and carry genetic information. A good scientific theory or model should have high explanatory and predictive power. In addition, this model is “beautiful” due to its simplicity. People once thought genetic material must be highly complex in light of the complexity of life, but it turns out to be a simple double helix with four combination of bases. This shows how scientists seek simple theories or laws to explain the diverse natural phenomena.</p>
<p>Watson and Crick published their findings in the journal Nature in 1953. Wilkins and Franklin also published their findings separately in the same issue. Franklin died of cancer five years later. Watson, Crick and Wilkins were awarded Nobel Prize for their discovery of DNA structure.</p>	<p>Publications are important records of scientists’ contributions to a discovery. Watson and Crick’s work were seen as the major contribution to the discovery since they had put together all pieces of evidence to make the complete DNA model, despite that the evidence is not wholly produced on their own. It is always controversial to attribute a discovery to the work of individual scientists given the cumulative and collaborative nature of scientific inquiry. Franklin was not awarded the Noble Prize probably because of several reasons: 1. She died before the award of the Nobel Prize; 2. Her contributions had not been clearly acknowledged in Watson and Crick’s paper; 3. She was a woman - the scientific community at that time was still dominated by men. The scientific community now generally honour Franklin’s contribution to the discovery of DNA structure and consider her unfairly treated. Watson and Crick were criticized for their improper behaviours. Plagiarism is regarded by the scientific community as a serious misconduct for all scientists irrespective of their authority.</p>

One major challenge in the development of the items is what counts as “informed” NOS views. Some treat constructivism as “informed” while positivism as “naive”. For instance, it is considered naive to say that “Science is concerned with facts. We use observed facts to prove that theories are true.” (Lederman et al., 2002, 514). We do not agree that this view is naive, though it tends to be more positivist. A naive positivist view would be a radical one such as “science is all about observed facts without any inference”, which, however, cannot be inferred from the statement above. Informed NOS views may include both positivist and constructivist understandings - scientific knowledge is both revolutionary and evolutionary, and both durable and tentative. Another issue pertaining to “informed” NOS views is mixing up “ought” and “is” (Chen, 2006). This is part of the semantic ambiguity found in the NOS assessment. Some items rely on some “key” words to judge if a statement is correct e.g. tentative, subjective, discover, invent, facts, truth, which have made unwarranted presumption that the respondents understand these terms the same as the test developers.

Item development of this study will attend to the above issues by carefully constructing the “informed” NOS views through a combination of items. Besides, to avoid semantic ambiguity, the quantifiers, ought/is and causal relations (e.g. must, may, likely) in the items were carefully used. A total of 31 response items clustered in eight questions were originally developed. Only 21 were retained after the validation process (Table 2). Each question pertains to one NOS aspect grounded in the story and the respondent needs to respond to each item on a 5-point Likert scale (1: strongly disagree; 2: disagree; 3: uncertain; 4: agree; 5 strongly agree).

Table 2: Assessment of NOS understanding in the context of DNA structure discovery

Item	Nature of Science
I. Do you think the DNA structure was discovered using scientific methods?	Scientific methods Both Franklin and Watson teams did not conduct controlled experiments to study DNA structure. Scientists use a variety of methods to investigate. Even the standard processes of scientific methods (questions, hypothesis, test and conclusion) are not strictly followed by scientists - Franklin produced the X-ray photos without a specific hypothesis about how the DNA looked like.
1. Constructing DNA model with metal plates and stands is not a scientific method.	
2. Taking X-ray photo of DNA by Franklin is not a scientific method.	
3. There is no fixed scientific method. What Watson, Crick and Franklin used to investigate DNA were scientific methods.	
II. Do you think the discovery of DNA structure by Watson and Crick needed creativity and imagination?	Creativity in science The DNA models cannot be logically deduced from the X-ray photo and other evidence, while creativity was needed to propose various DNA models that fit with the evidence. Scientists need to be creative, particularly for hypothesis generation and testing design. However, the interpretation of evidence and drawing conclusion are largely logical and evidence-based.
4. No, creativity and imagination were not involved since the DNA structure was logically deduced from the evidence.	
5. No, creativity and imagination were not involved since scientists had to be absolutely objective and logical.	
6. Yes, they needed creativity and imagination to propose various hypotheses on the DNA structure.	
III. The Nobel Prize was awarded to Watson and Crick for their discovery of DNA structure. Do you think they had discovered the DNA structure wholly on their own?	Competition and collaboration Watson and Crick’s discovery of the DNA structure was based on the findings from many other scientists, such as Franklin’s X-ray photos and Chargaff’s rules. Science advances in a
7. No, as well as Watson and Crick, some other	

<p>scientists had made important contributions to the discovery of DNA structure.</p>	<p>gradual and cumulative manner through the work of many scientists, rather than a sudden discovery done by a few scientists out of nothing. This nature of science sometimes makes the allocation of merits to different scientists controversial. Watson and Crick were seen as the major contributors to the discovery since they had put together all pieces of evidence to construct the complete DNA model.</p>
<p>8. The Nobel Prize should be awarded to Watson and Crick because they had made the most important contribution by constructing the complete DNA model.</p>	
<p>IV. Were Watson and Crick collaborating or competing with other scientists in their investigation of DNA structure?</p>	<p>Competition and collaboration Watson learned from Franklin at the seminar that DNA is likely a double helix. They shared findings even though they were competitors. Scientific community encourage exchanges of ideas and findings through seminars, conferences and publications. It allows scientists all over the world to collaborate and compete directly and indirectly. Transparency and peer critique are two core practices of the scientific community to ensure the advances of science.</p>
<p>9. They were both collaborating and competing with other scientists through sharing ideas and findings at seminars and by publications.</p>	
<p>10. Science research emphasizes peer critique and transparency as a means of both competition and collaboration.</p>	
<p>V. Watson and Crick got important clues from Franklin's X-ray photo and report without her knowledge. They also did not mention it in their paper in Nature. Do you think they were unethical?</p>	<p>Ethics in science Scientific community encourages exchanges of ideas and findings, but the sources of the ideas and findings have to be acknowledged clearly in publications. This allows the contributions of each scientist to be credited fairly. Most scientists follow these ethical principles strictly, though plagiarism does sometimes happen, which is seen as a serious misconduct in the scientific community. Watson and Crick were unethical in some sense, but the whole story was not known at the time they were awarded the Nobel Prize. Besides, bias against woman scientists in the 60s might be one of the factors that made Franklin's contributions not properly recognized.</p>
<p>11. They were unethical since scientific research should not use other scientists' findings.</p>	
<p>12. They were not unethical since scientists do not care about ethics; only the findings are important.</p>	
<p>13. They were not unethical; otherwise, they would not have been awarded the Nobel Prize.</p>	
<p>VI. Now, after more than 50 years, the DNA structure proposed by Watson and Crick is still considered to be correct. Has it become a truth?</p>	<p>Science knowledge as truth Since its discovery in the 50s, the DNA structure has been widely used in molecular biology and so far no evidence shows that this basic DNA structure is incorrect. It is a durable and reliable scientific model that almost no scientists would doubt its correctness. However, all scientific knowledge (virtually all empirical knowledge) is tentative in an absolute sense, meaning that it is still subject to revision in the future when new findings emerge. This tentativeness of science knowledge - how likely it will change, however, varies considerably. A well-established scientific theory like the DNA model is much less tentative than some newly proposed theories.</p>
<p>14. Yes, the DNA structure has become an "absolute" truth that will never be wrong.</p>	
<p>15. Despite that the DNA structure cannot be said an "absolute" truth, but for most scientists it is very unlikely to be found incorrect in the future in light of its abundant evidence.</p>	
<p>16. Scientific knowledge can never become an "absolute" truth that is never wrong. It is still subject to revision when new evidence appears.</p>	
<p>VII. In their paper in Nature, they wrote: "... it (proposed DNA structure) is roughly compatible with the experimental data, but it must be regarded as unproved until it has been checked against more exact results". Why did they claim that the DNA structure</p>	<p>Tentativeness of scientific knowledge There are many factors making scientific knowledge tentative. First is about its empirical, inductive nature, which makes all empirical knowledge fallible. Second is about the hypothetical deductive nature of scientific</p>

was “unproved”?	inquiry, which makes scientific theory subject to the problem of underdetermination. The rest are about the errors and biases during scientific inquiry, which are avoidable to some extent.
17. All scientific knowledge, including the structure of DNA, can never be proved to be absolutely true.	
18. New evidence may emerge to disprove this DNA structure.	
19. There could be another DNA structure that are also compatible with the experimental data.	
20. There could be errors in conducting the experiments.	
21. There could be bias in interpreting the experimental data and drawing conclusion.	

Instrument Validation

The validity of this instrument lies partly in the above principles of item development that has avoided some problems of semantic ambiguity and “informed” views. The contextual nature of the items also helps to avoid the problem of overgeneralization. The questions and items developed were then independently examined by three science educators on their face and content validity. Particular attention was paid to whether the NOS aspects are accurate and could reflect an informed NOS view in the context. Some ambiguous expressions and NOS concepts were revised after the expert feedback. Thirteen students were interviewed to check if they interpreted the items in the same way as the item developers and their responses could accurately reflect their views.

Multi-dimensionality

The multi-dimensionality of the instrument was worked out using confirmatory factor analysis (CFA) with LISREL. CFA was used because the models were principally informed by the NOS literature. During model construction, conceptually related NOS items were put into different models to see if they fitted with the data, in which compromises were made between data and conceptual fits. Finally, out of the 31 items, 21 items were used to build three models each having two sub-scales of NOS aspects (Figure 1).

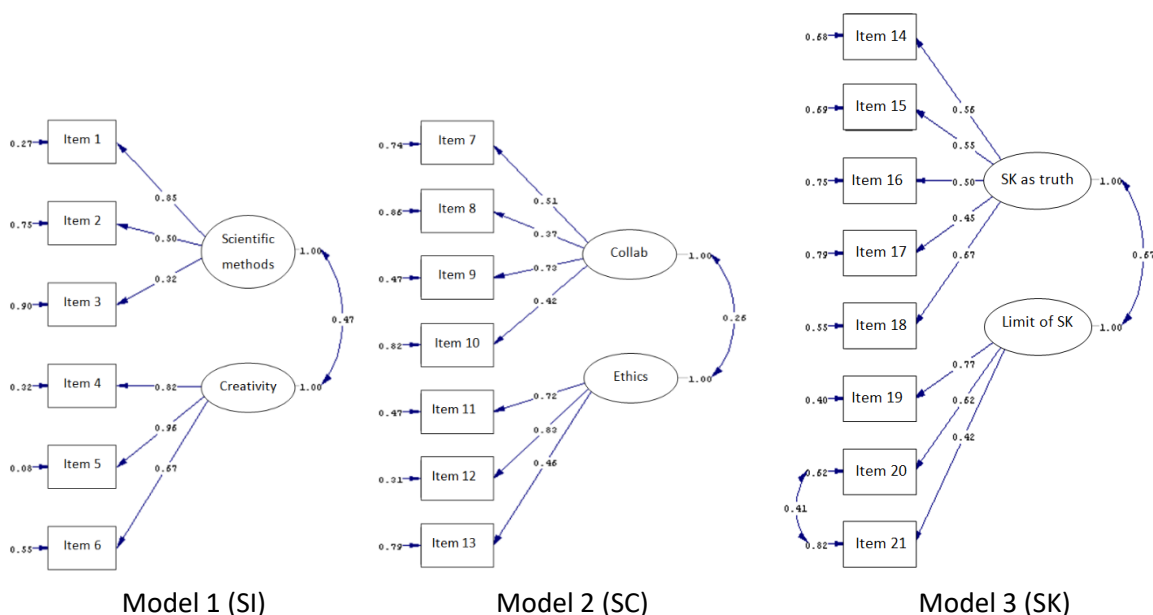


Figure 1: Models of NOS scales and sub-scales

The three models have reflected the three main areas of NOS: scientific inquiry (SI), scientific community (SC) and scientific knowledge (SK), and the sub-scales in each model are also conceptually related: creativity is inherently part of scientific methods in Model 1 (SI); ethics guides the collaboration and competition within scientific community in Model 2 (SC); scientific knowledge as truth or not is related to the limitations of scientific knowledge in Model 3 (SK). These models and sub-scales have included many NOS aspects deemed important to science education. Some commonly assessed NOS aspects such as scientific laws and theories and differences between observation and inference are missed since they were either not embedded in the story or eliminated in the process of CFA.

Most of the items in the models have a factor loading larger than .50 (Figure 1), meaning that the models have practical significance in a sample size of about 120 (Hair et al., 112). Although there are a few items with relatively low factor loading: Item 3 (.32) and Item 8 (.37), they were retained in light of their conceptual fit with the constructs and the overall model fit with the data. With regard to the model fit, the fit indices CFI, NNFI, GFI and AGFI of the three models are all larger than .90, with many above .95 (Table 3), indicating that the models are acceptable (Hu, & Bentler, 1999). The RMSEA of the three models are .08, .02 and .07 respectively, indicating good to mediocre fit (MacCallum et al., 1996). Despite that the Chi-square tests are significant in model 3, the relative Chi-square indices (Chi-square index divided by the degrees of freedom), which are less sensitive to sample size, are all less than 2, indicating an acceptable model (Ullman, 2001).

Table 3: Fit indices of the NOS models

	Chi-square	Relative Chi-square	RMSEA	CFI	NNFI	GFI	AGFI
Model 1 (SI)	15.44	1.93	.0812	.971	.945	.965	.908
Model 2 (SC)	13.73	1.06	.02	.993	.989	.973	.942
Model 3 (SK)	29.48*	1.64	.0673	.959	.936	.95	.901

*p<.05

The items of each sub-scale were moderately to highly correlated (.48-.82) (Table 4). There are small to medium significant correlations between the sub-scales (.19-.40) (Table 5), which are common in multi-dimensional framework studies (e.g. Liu, & Tsai, 2008). This reflects the conceptual associations between various NOS constructs but a multi-dimensional model is still preferred over a uni-dimensional model as supported by the CFA and conceptual analyses.

Table 4: Mean scores of items and NOS sub-scales (5-point Likert scale)

	Item	Mean	Std. Deviation	Alpha	Sub-scale Mean
1. Scientific inquiry					
1a. Scientific methods (SM)	1*	3.67	.83	.50	3.74
	2*	3.98*	.81		
	3	3.58	.96		
1b. Creativity	4*	3.82	.86	.82	3.90
	5*	3.89	.92		
	6	4.06*	.79		

2. Scientific community					
2a. Collaboration and competition (Collab)	7	3.83	.70	.48	3.83
	8	4.04	.65		
	9	3.78	.66		
	10	3.68	.77		
2b. Ethics	11*	3.81	.84	.61	3.76
	12*	3.79	.88		
	13*	3.74	.91		
3. Scientific knowledge					
3a. Scientific knowledge (SK) as truth	14*	3.84	.89	.56	3.92
	15	3.96	.64		
	16	4.06	.82		
	17	3.63	1.09		
	18	4.13	.67		
3b. Limitations of scientific knowledge (SK)	19	3.89	.70	.61	3.95
	20	4.04	.69		
	21	3.94	.66		
Valid N (listwise)	140				

*The item is reversely coded (i.e. 1: strongly agree; 5: strongly disagree”) in the analysis.

Table 5: Intercorrelations of NOS sub-scales

	1a	1b	2a	2b	3a	3b
1a. Scientific methods (n=129)	1	.22*	.04	.39**	.19*	.01
1b. Creativity (n=129)		1	.20*	.40**	.36**	.15^
2a. Collaboration and competition (n=129)			1	.16^	.37**	.30**
2b. Ethics (n=128)				1	.26**	.08
3a. Scientific knowledge as truth (n=129)					1	.28**
3b. Limitations of scientific knowledge (n=128)						1

^p<.10; *p<.05; **p<.01

Results

NOS Views

In general, the NOS views of the students were more or less informed in all sub-scales, with scores ranging from 3.74 to 3.96 (Table 4). Scores of scientific methods and ethics were significantly lower than that of the two sub-scales of scientific knowledge. There are significant correlations among the six NOS sub-scales (Table 5), wherein SK as truth seems more central by having moderately strong correlations with five other NOS sub-scales. These correlations have revealed the intertwining nature of NOS aspects.

We can understand more nuances about students' NOS views at item level. Students generally considered making X-ray photo of DNA is a kind of scientific method (Item 2: 84% agree), but seemed more hesitant about Watson's model construction (Item 1: 10% disagree; 22% uncertain) and the generalization that there is no fixed scientific methods (Items 3: 21% disagree; 26% uncertain). It seems that many students still think there are “standard scientific methods”, but it is likely that they were referring to the general process of scientific inquiry rather than specific methods.

As for the role of creativity in science, students tended to agree creativity is involved in science (average score 3.92), particularly on hypothesis generation (Item 6: nearly 90%

agree), but a number of them also agreed that DNA structure is logically deduced from the evidence without the use of creativity (Item 4). Item 5 is an “ought” item that 83% students disagreed that scientists had to be absolutely objective and logical. Some students said in the interview that it is impossible to be absolutely objective, showing that “ought” and “is” are intertwining in response.

While students generally understood that scientists collaborate (Item 9: 71% agree) and critique each other (Item 10: 57% agree), the high percentages of uncertain responses of the two items (24.3%, and 22.2%, respectively) may have revealed that students had difficulty in resolving the conflicts between collaboration and competition, and between transparency and confidentiality in science. This dialectical nature of science is one of the most challenging parts in NOS teaching and learning.

The sub-scale ethics has the second lowest score (3.76). The low score mainly came from the high percentages of uncertain responses of Items 11 to 13 (around 20%). While about 70% of students agreed that scientists have to follow some ethical norms, many of them seemed puzzled by what counts as ethical in the scientific community, which is sometimes not easy to draw a line.

Consistent with other findings (Lederman, & O'Malley, 1990; Tsai, & Liu, 2005), students showed good understanding of the tentative nature of scientific knowledge as shown by the high scores of the sub-scale SK as truth (3.92). The combined results of Items 14 and 15 revealed that while 74% students disagreed that the DNA model represents truth, 85% students agreed that “it is very unlikely to be found incorrect in the future.” This shows that most students were having tentative but not radical constructivist view, which is judged to be informed in this study. Item 17 is a generalization of Item 14 from the DNA model to all scientific knowledge, but it had a much less agree responses (62% compared to 84%) and larger SD. This has highlighted the problem of overgeneralization in general NOS tenets. As for the limitations of SK, most students accepted errors and bias exist in doing science (Item 20-21: 85% and 81% agree), but seemed not so certain about the role of under-determination as the inherent limitation of scientific theory (Item 19: 19% uncertain).

NOS views and other factors

Students were assessed on their attitudes toward science (Table 6). Multiple regressions and path analyses were conducted to explore the relations between students' NOS views in different sub-scales and various background and attitudinal variables (Table 7). Girls generally had better understanding than boys about the social and ethical aspects of the scientific community (.18, $p < .05$; .15, $p < .1$). Whether students have taken any senior secondary sciences is only marginally related to SK as truth (.16, $p < .1$). Students without religion tend to disagree that science involves creativity (-.18, $p < .05$). Students with more positive attitudes toward science tended to have more informed views in creativity and scientific knowledge.

Table 6: Examples of items for the assessment of students' attitudes toward science

Item	Students' Feedback
Self-efficacy in science	I am confident in reading science-related texts.
	I understand the development of natural science.
Interest in science	I am interested in natural science.
Instrumental value of science	Scientific knowledge is important for my intellectual development.

Table 7: Correlations of NOS sub-scales with background and attitudinal variables

	Scientific Methods	Creativity	Collaboration and Competition	Ethics	Scientific Knowledge as Truth	Limitations of Scientific Knowledge
Gender (Girl)	.07	.05	.18*	.15^	.05	.03
Any science subjects taken in senior secondary (USSci)	.06	.05	-.06	.07	.16^	.13
Religion (no religion)	-.12	-.18*	-.08	-.11	-.09	.05
Self-efficacy in science learning	.00	.05	.08	.06	.20*	.10
Interest in science	-.00	.19*	.06	.16^	.28**	.09
Personal value of science	-.09	.19*	.04	.08	.16^	.23*

* $p < .05$; ** $p < .01$; ^ $P < .1$

Path analysis was conducted with LISREL to explore further the relations between the variables and NOS views. Based on the results of the multiple regression analyses, various models were tried, from which three were found fit to the data and conceptually acceptable (Figure 2). The three models have relative Chi-square indices lower than 2, other fit indices (e.g. CFI) over .9, and RMSEA ranging from .03 to .07.

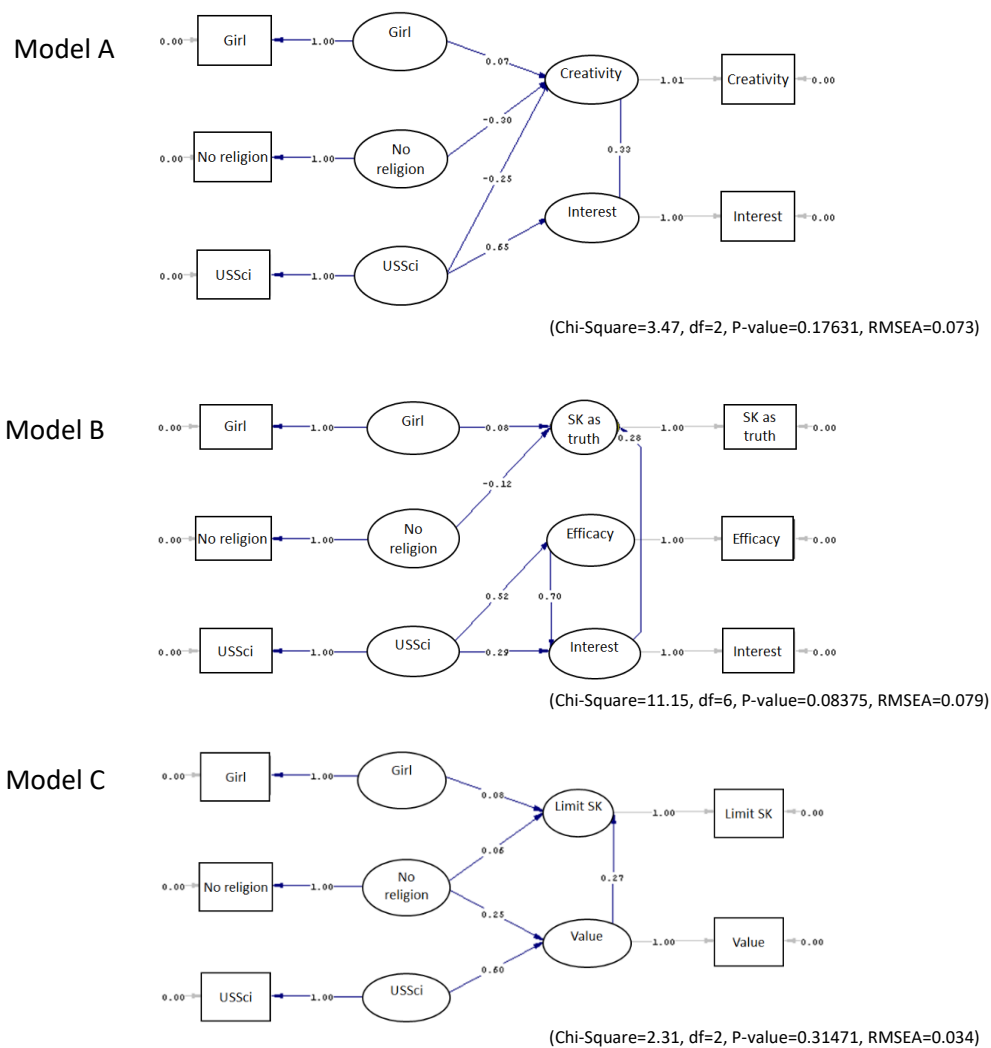


Figure 2: Models of path analysis showing how different variables affect the NOS sub-scales

Model A is about creativity. The scores in creativity are negatively related to no religion (-.30) and upper secondary science learning (-.25), but positively related to interest in science (.33). Interestingly, the indirect effect of upper secondary science learning as mediated by interest in science is positive (.65 x .33=.22). That means science learning in upper secondary would make students better recognize the role of creativity in science only if it could enhance students' interest in science; otherwise, it had negative impact. A possible reason is that science instruction emphasizing the creative and humanistic side of science tends to be more interesting to students. On the contrary, science instruction that focuses on science content for examination preparation would portray science as rational activities that are hardly creative. As for why students without religion tend not recognizing the creative side of science, it may be a result of the connections between atheism or agnosticism with empiricism and rationalism.

When a similar model was constructed for SK as truth, most relations were found insignificant. Only after adding self-efficacy in science as a mediator could a better fit model be produced (Model B). SK as truth is only related to upper secondary science learning as mediated by interest and self-efficacy in science. It shows that the students who are interested

and feel confident in science learning tend to be able to appreciate the durable but tentative nature of scientific knowledge.

In model C, limitations of SK are moderately and indirectly predicted by upper secondary science learning and no religion when mediated by personal value of science (value). It shows that students without religion and having studied science at upper secondary tended to recognize more the limitations of science when they find science valuable to them.

Taken together, the three models suggest that three sub-scales of students' NOS views: creativity, SK as truth, limitations of SK, are moderately affected by upper secondary science learning experiences directly, or indirectly via interest, efficacy and personal value of science. Besides, students without religion tended to have weaker understanding of the creative nature of science but better on its limitations when they found science valuable.

Discussion and Conclusion

The study has shown how to develop a multi-dimensional NOS instrument in the context of a specific scientific discovery. A grounded approach was taken by extracting NOS aspects from the story for item construction. It is also important to reduce the problems of semantic ambiguity by attending to the use of quantifiers, causal relations words (e.g. must, may, likely) and expression of ought/is. This is supported by the findings that items with general NOS claims and unspecified quantifiers and scopes tended to receive more uncertain responses. Avoiding semantic ambiguity also helps researchers to judge more accurately a response as informed or naive. A case in point was shown in the interview that some students considered scientific knowledge that is directly observable as truth, but not for scientific theories that are inferred from observations. It is thus problematic for some general NOS assessment items that do not specify what scientific knowledge is being referred to: observations, theoretical constructs (like species and atoms), or scientific laws and theories.

In the study, most students' NOS views were found "informed" to a certain extent, at least not naively espousing the radical positivist or constructivist stances. Most students did not regard science as entirely objective and rational, but still believed in the credibility of scientific knowledge. But many students seemed not understanding well how scientists can be both collaborative and competitive, and what is ethical in science. The goal of NOS education should not be simply shaking up students' positivist views toward constructivist; instead, it should be focusing on understanding how scientific knowledge is made reliable, or unreliable, by the various practices of scientists and the scientific community, which Allchin (2010) called Whole Science. Given that the various NOS aspects were found extensively inter-correlated in this study and others (Liu, & Tsai, 2008; Tsai, & Liu, 2005), NOS instruction should therefore be holistic and coherent by centering around why scientific knowledge is "nearly" truth in connection with how scientific inquiry is conducted and how scientists work as a community. Understanding the dialectical nature of science with regard to collaboration and competition, openness and confidentiality, and objectivity and subjectivity, should be at the core.

Different from Tsai and Liu's (2005) findings that girls do not perceive the creative and tentative nature of science as well as boys, this study found that girls were not different from boys in any NOS sub-scales as shown by the multiple regression and path analysis models (Table 7; Figure 2). It seems that simple correlations of gender to NOS views (Table 6) were spurious after other factors have been considered. Given that girls are generally found having less interest and self-efficacy in science (Jovanovic, & King, 1998; Lam, & Lau, 2014), the

effects of gender on NOS understanding, if any, would likely be via some attitudinal variables. While some studies found associations between college majors and NOS views (Liu, & Tsai, 2008; Miller et al., 2010), we found upper secondary science learning a good predictor of college students' NOS views as mediated by interest, self-efficacy and value of science.

This study also found that interest in science and other attitudinal variables seem playing an important role in students' NOS views, which has been suggested in other studies (van Griethuijsen et al., 2015). We think the relations between science learning, attitudes in science and NOS views are complex and reciprocal. On the one hand, NOS views may influence learning: students with more constructivist view tended to learn science better (Liang et al., 2010; Tsai, 1998). On the other hand, when science instruction attends more to the humanistic, social, historical and creative sides of science, it not only makes students better understand the nature of science, but also enhance their interest in science. As shown by the interview findings, students with good NOS understandings tended to be more interested in and knowledgeable about science. They were able to articulate concrete scientific story to support their views. Religion was also found moderately related to one's understandings about creativity in science. It is probably a result of the more empiricist worldview held by the atheistic students, rather than a fundamental conflicts between religion and science. Nevertheless, education about the conflicts between religion and science should be an indispensable part of science education. This study has provided information on students' views on NOS which is valuable for course instructor to better design the curriculum and instruction of NOS-related course such as the foundation course "In Dialogue with Nature". Nonetheless, given the cultural differences in NOS views and interest in science (van Griethuijsen et al., 2015), the findings of this study may be only applicable to Chinese or Asian students. Research with more subjects of different nationalities and educational levels would be insightful.

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The Effect of a Single Bout of Balance and Coordination Exercise on Learning and Memory of Young Adults

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Abstract

Introduction: A single bout of physical activity was found to improve executive functions, attention, cognitive speed and episodic memory. Balance and coordination exercises are known to involve activation of the cerebellum, which influences attention, working memory, and verbal learning and memory.

Purpose: To assess the influence of a single bouts of balance and coordination exercise on learning and memory of young adults.

Methods: 16 physically active young adults (age = 28 ± 2.61 yr) performed six appointments: a PA intervention, or control condition (watching a silent film) for 25 min, which was followed by an exam about one of two subjects: dolphins or chocolate. Then they were presented with an informative video about the subject, and examined on it. 24 hours and two weeks later, they performed two more exams about the subject. In the 2nd phase they were presented and examined about the second informative video in the second condition.

Results: At two weeks following the exposure to the informative video, participant had a significantly higher Total score, in the PA phase in comparison to their performance two weeks following exposure to the informative video in the control condition, implying a positive effect of PA on the retention phase.

Key words: Learning, long-term memory, physical activity, balance and coordination

Main Conference Topic: Education, Teaching and Learning: Effective Teaching Pedagogies/ Learning Styles and Learning Outcomes

Introduction

Extensive evidence suggests that physical activity (PA) has powerful effects on brain function and structure. Physiological mechanisms including increased cerebral blood flow, changes in neurotransmitter release, structural changes in central nervous system and altered arousal levels have been found to occur as a consequence of the PA (Gligoroska&Manchevska, 2012).

The stimulation of brain neurotransmitter release after acute bout of exercise has also been suggested by several authors. Increased levels of norepinephrine (Brudzinsky& Gibson, 1997; Meeusen et al., 1997), epinephrine (Floresco, Todd, & Grace, 2001) and serotonin (Fortin, Agster&Eichenbaum, 2002; Girard& Garland, 2002) in the brain of animals have been documented.

Many studies have examined the effect of PA on cognitive functions, but mainly assessing simple reaction time or accuracy (Tomprowski, 2003) with only a few studies directly assessing the effects of PA on learning or on long-term memory. The differences between the immediate and the delayed effect of PA on cognitive function depend on learning and memory processes, which are usually separated into three main phases: the fast learning, memory consolidation phase, and the long-term retention phase (Dorfberger et al., 2007; Karni, 1996; Korman et al., 2003). Recently, Roig et al., (2012) examined if a single bout of intense cycling improves motor memory and motor skill learning, and found that exercise groups showed a significantly better retention of a motor skill 24 hours and 7 days after practice.

The type of PA being performed may differentially affect cognitive functions. To date, most studies investigated changes in cognition after an acute bout of aerobic or resistance exercise. Other forms of exercise may also affect cognition. Postural stability and coordination exercises are known to involve activation of the cerebellum, which influences motor functions as well as a variety of neurobehavioral systems including attention, working memory, and verbal learning and memory (Budde et al., 2008). Based on the above mentioned, the purpose of the current study was to assess the influence of a single bouts of balance and coordination exercise on learning and memory of young adults.

Methods

16 young adults (eight females) aged 25 to 32, with no ADHD, neurological or orthopedic injuries participated in Experiment 2. Eight participants were presented with and examined about the informative video (about dolphins / chocolate - A or B) after the PA intervention (stability and coordination session), and in the 2nd phase two weeks later were presented and examined about the second informative video (B or A) in the control conditions, which included watching a silent film, prior to the video presentation. The rest of the participants had the order of the conditions (phases) reversed. The assignment of the order of conditions and the video for learning in each of the phases was random.

Each participant had six sessions in the study: in the first session (after performing intervention or control condition), participants performed a pre-test (T0) – answering two open questions about the subject they were about to watch (at this stage they answered the questionnaire based on their general knowledge). Then they watched a 6-minute video (one of two informative videos A or B, each of which presents information about a different topic), in a quiet room, with no interferences. The participants were asked to remember as many facts as possible from the video.

Immediately following watching the video, a knowledge test (T1) was performed. The participant were asked to answer eight multiple-choice questions about the information presented in the video. This assessment was used to evaluate the fast learning phase. Twenty-four hours later, they performed another test (T2) (same structure as T1, but with different

questions). This test was used to assess the consolidation phase (T1 vs T2). Two weeks following T2, a fourth test (T3) was conducted (same structure as T1-T2, but with different questions). This test was used to evaluate the retention phase. Sessions 4-6 were performed in the same manner as sessions 1-3, however, each participant performed the other condition prior watching the informative video about another topic.

Assessment of each test was based on two different scores: Total score (sum of correct answers) and number of mistakes.

Results

Figure 1 presents the performance of the participants in the two study conditions (intervention, control). Overall, the results of this study showed that the PA intervention (a single 25 minute long session of stability and coordination exercises) had a positive effect on the retention phase. As can be seen on Figure 1 at two weeks following the exposure to the informative video, participant had a significantly higher Total score and a lower number of incorrect answers, in the PA (intervention) condition in comparison to their performance two weeks following exposure to the informative video in the control condition. Participants had very little background knowledge about the subjects covered in the two informative videos, scoring on average 1.035 points (out of 10) before the video presentations.

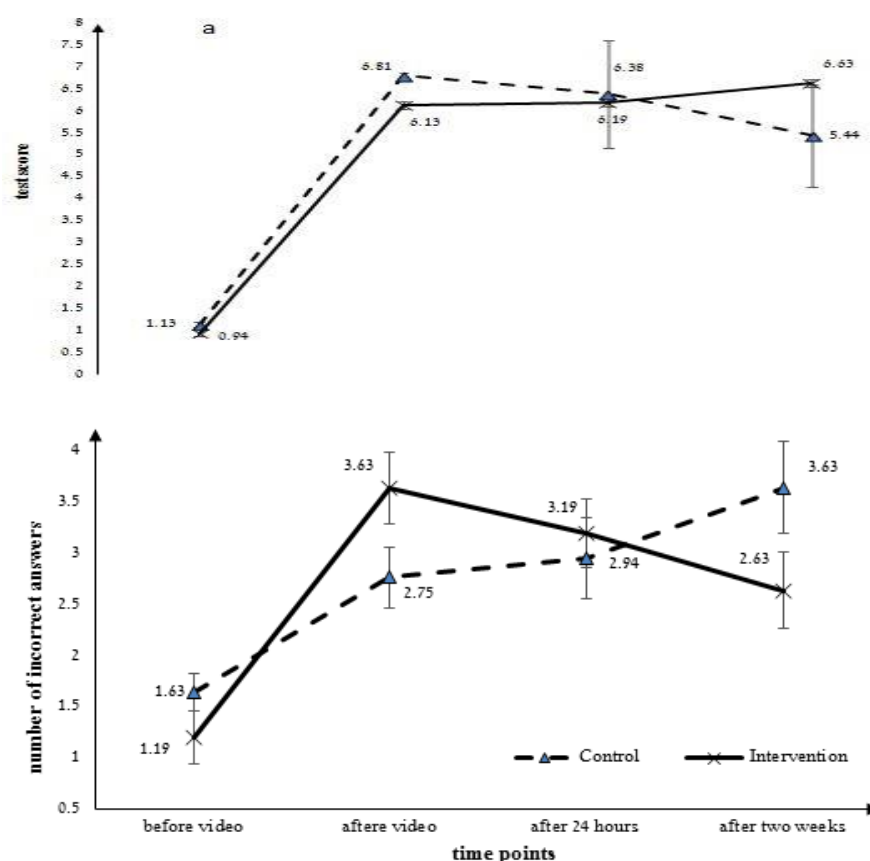


Figure 1 - The learning curve of the test score and number of incorrect answers in both learning conditions at four assessment points: before video, after video, after 24 hours and after two weeks.

A repeated measures ANOVA with time-points (before, immediately after, 24 hours, 2 weeks after video exposure) as a within-subject factor, showed no significant time-point

effect ($F_{3,48}=2.14$; $p>.05$), and condition (intervention, control) as a between-subject factor ($F_{1,15}=0.10$; $p>.05$), however the interaction time X condition was found to be significant ($F_{3,48}=7.65$; $p<.01$).

Conclusion

The results of the study show that a single bout of PA comprising 25 minutes of balance and coordination exercises had a clear advantage in the participants' ability to retain information from an instructional video presented after the PA intervention. Importantly, the most robust effect of the PA was on performance at 2 weeks post training.

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Internationalizing Higher Education: A Critical Overview

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Abstract

Internationalization has become one of the central themes of higher education in recent years. This theme or agenda has many manifestations including: competing for a greater proportion of international staff and students, encouraging staff and student exchanges between institutions, internationalizing the curricula for home students, and fostering a greater degree of intercultural contact between students. Straddling these various initiatives are also two other major dimensions through which higher education now legitimates its purpose: the development of graduate attributes as well as global citizens. Some initiatives are primarily directed at institutional economic benefit or prestige in the pecking order employability, others at enhancing students' employability, and yet others focus more on citizenship and civic responsibility. These are not mutually exclusive although there has been a more recent concern with the development of the latter. This paper provides a critical overview of the internationalization agenda taking into account recent literature in the field and highlighting some problematic issues.

Keywords: higher, education, internationalization, citizenship

Main Conference Topic: Higher Education

Introduction

Across many higher education institutions, internationalisation has been appropriated within the larger culture of marketisation. This has played out in a number of ways: seeking to improve market share of international students and the higher fees that accrue from their recruitment, attracting more international staff and an index of the prestige and global position of an institution, and developing international partnerships as a means of enhancing international reach and influence (Lumby and Foskett 2016). Despite the increasingly competitive and marketized climate in higher education an alternative approach to internationalisation strategies and processes has emphasised ethical, social, cultural and academic aims (Pashby and Andreotti 2016). In this vein, a key challenge for aim for the internationalisation of higher education is the inculcation of international and cross-cultural perspectives and understandings among students in order to prepare for a more globalised world in a broader sense, but also including an increasingly globalised knowledge economy.

Therefore, the aim of internationalizing higher education is also related to notions of citizenship and preparedness for a more globalized world, not only in terms of labour mobility, but also with respect to the understandings, experiences and perceptions of the non-mobile majority (de Wit et al., 2015). Internationalization at home has been usefully defined by Beelen and Jones (2015: 76) as the 'purposeful integration of international and intercultural dimensions into the formal and informal curriculum for all students within domestic learning environments'. This 'purposeful integration' effectively means that curricula need to be internationalized with teaching staff being key to the enterprise

(Bedenlier and Zawacki-Richter 2015). However, contextualizing curricula and learning outcomes in programmes of study and their associated assessment criteria for ‘at home’ students who may well have limited contact with other forms of internationalization is a particular challenge (Jones 2014; Jones and Killick 2013; Beelen and Jones 2015). However, while challenging, the pay-off is worth the effort in terms of enabling students to explore and engage with global issues and each other (Nilsson 2003; Seeber et al. 2016). The development of ‘global mindsets’ (Jones and Killick 2013) can lead to ‘a greater capacity to manage difference, change and complexity’ (Marginson 2017), and a greater understanding and acceptance of ‘plural cultures’ (Mak 2010)

Internationalization at Home

Robson, Almeida and Schartner (2018: 21) argue that the internationalization at home agenda can be used to promote more social and values-based goals for all students and that this is timely given

‘...recent political events in the UK (the Brexit vote), America (the presidential election) and Europe (with political unrest arising from the large-scale migration of thousands of people fleeing conflict) have revealed deeply rooted social schisms.’

Higher education institutions can therefore utilize the internationalization at home agenda to address the underlying manifestation of these issues in terms of attitudes and perceptions towards political or economic, religious or cultural, ethnic or linguistic conflict (Marginson 2017). In addition, this agenda can also be used as a means of developing attributes and abilities that contribute to the active and responsible citizens in globalized, knowledge-based economies (Barker and Mak 2013).

However, Robson, Almeida and Schartner (2018: 31) found in their case study of two universities in the United Kingdom and Portugal that the ‘much vaunted internationalized university experience for all’ (particularly for the non-mobile) are not systemically prioritized in institutional agendas for internationalization.’

Part of the problem is how internationalization is operationalized across various institutions. As Man Ling Lee (2005: 210) argues

‘...interculturalism in teaching is not about covering multiple cultures, rather it is about working through a dialogue between cultures [...] the focus should then be on the dialogue itself rather than on the multiplicity of voices for the sake of inclusivity. In short, our job is to ensure that students can carry out a critical dialogue with others, regardless of who they are. This is a life skill that does not end with a course or a program of study.’

The importance of graduates acquiring intercultural competence (Deardorff & Arasaratnam-Smith, 2017) is an aspect of the notion of the ‘global graduate’ who is able to recognize and value cultural difference.’

As well as the personal citizenship dimension illustrated above, there is also an employability dimension. For example, in the United Kingdom, Diamond et al. (2011) report that employers value graduates who, amongst other things, have a global mind set, intercultural agility, and embrace multiple perspectives. Kumaravadivelu (2012: 4) argues that the current period is one in which

‘...cultures are in closer contact now than ever before and influencing each other in complex and complicated ways. This development is creating a global cultural consciousness, and along with it, creative and chaotic tensions that both unite and divide people.’

The challenge for higher education institutions is how to operationalize the internationalization agenda in such a way as to inculcate in students an intercultural awareness and ability to be operate a complex globalized world. However, research over recent years has consistently pointed to a lack of discussion within higher education institutions, weak levels of support for the internationalization agenda, and gaps in institutional rhetoric and strategy claims, and pedagogic practices in the classroom (Bond et al. 2003; Dewey and Duff, 2009). Bond et al. (2003) suggested that in addition to the problems outlined above, there is often inadequate institutional support, work overload amongst staff, and failure to recognize disciplinary specifics. The problems are further compounded by a lack of recognition and reward associated with efforts in changing pedagogic practices in favour of a more internationalized approach (Dewey and Duff, 2009; Florenthal and Tolstikov-Mast, 2012).

Barnett (1994) has suggested that the implementation of new initiatives in higher education institutions with respect to quality are often viewed by staff as a bureaucratic imposition leading to resistance in the face of eroding levels of academic autonomy. In the ever-changing landscape of higher education initiatives, agendas, and strategies, internationalization can seem as a top-down imposition that first-and-foremost serves institutional ends in terms of prestige and economic interest in response to a changing global context. The corollary of this is that from the perspective of staff it can seem like a further erosion and constraint of academic freedom in terms of curriculum design and delivery. However, the internationalization agenda is not simply yet another slogan or means of economic strategy to be pursued by higher education institutions. Green and Whitsed (2012: 3) argue that the internationalization of the curriculum is difficult to define because it couples two fuzzy, ideologically laden terms: “internationalization” and “curriculum”. However, a greater breadth to understanding internationalization can be linked to other concepts and initiatives, such as graduate attributes, global citizenship and the inclusive curriculum, to make for a more coherent and integrated approach to curricular reform.

Global Citizenship as a Graduate Attribute

The notion of global citizenship is a somewhat changeable, and contested concept (Hunter et al. 2006). The internationalization agenda in higher education has shifted ground from being simply and economic driver to different and new context to that of the philosophical debates regarding citizenship and globalization (Carter 2001). In the context of higher education, it is often presented as a set of competencies and set within institutional frameworks as a graduate attribute in terms of a capacity that is developed throughout the curriculum regardless of subject or disciplinary background. Whilst the articulation of global citizenship in this way varies across institutions, the dispositions or capacities often ascribed to it such aspects as an openness to other points of view and cultures, an understanding and appreciation of social and cultural diversity, a respect for human rights, and sense of public or civic responsibility. However, when referred to as a graduate attribute, its meaning is often assumed and not specified by institutions. Kirk, Newstead, Gann and Rounsaville (2018) in their study found that academic staff are often unclear on how such a diffuse graduate

attribute might best be embedded into their curricula. The danger here is that academic staff engage in a tick-box exercise in which they tick-off various criteria associated with graduate attributes as related to their curricula and pedagogy “without considering how they are actually going to develop and test these attributes” (Leask 2013: 10). Thus, while the concept may be attractive to institutions and be associated with a “good feel” (Clifford and Montgomery, 2014), there is a danger that it can be adopted as nothing more than an “empty rhetoric” Henderson (2013:736).

Joseph (2013) advocates a more genuinely more transformative approach to higher education that focuses on encouraging student to challenge assumed cultural hierarchies. Such an approach emphasizes the cultural and social aspects of global citizenship and the scope for intercultural learning as a significant aspect of the curriculum. This is a more expansive and critical understanding of global citizenship, one that is not shy away from the political impact of higher education in enabling students to critically evaluate and challenge familiar or typical practices, perceptions, norms, values and beliefs (Caruana 2011), or question Western bias and privilege within curricula and to perhaps lead to significant revisions to current pedagogic practices.

Graduate Attributes and Intercultural Contact

The idea that students from different countries and cultures provide a beneficial experience for home students, whilst appealing as broad liberal aim in developing intercultural understanding, is nonetheless somewhat vague with respect to actual pedagogic practice. However, an educational experience that trades on intercultural contact raises several important pedagogical issues, and in particular its relevance for the development of graduate attributes. Turner (2009: 242), for example, draw attention to some of these:

‘In what context does the evidence support the idea that wider social and cultural integration encourages better individual academic performance, for example? How far is social learning and interpersonal development represented as an intrinsic part of the curriculum? How does the curriculum ensure that attempts to facilitate student integration are adequately supported, evaluated, and assessed? Are teachers able to deliver the skills development that would enable students to achieve the sophisticated levels of intercultural communication inherent in diverse group interactions?’

While higher education is faced with challenges arising from the widening of participation in socio-economic terms within local populations, there is also an added dimension of problems associated with the internationalization agenda. If the focus on graduate attributes is thrown into the mix then the complexity of pedagogic issues that confront higher education is apparent. The discourse of graduate attributes is culturally and ideologically loaded and therefore it is incumbent upon educationists to adopt a critical, if also supportive position with respect to their dominance in higher education policy.

This raises the issue of the local-global dimension to graduate attributes and how we begin to develop this so as to encourage students from the outset to consider themselves and their relationship to their studies within this much broader context (e.g. with respect to environmental issues and ethics or with respect to the relationship between science and human rights). This is set within the context of challenges that the coming decades may bring, including: new relationships between humans and technology, the opportunities and challenges of aging populations, the development of new forms of knowledge and democracy, the challenges of climate warming and environmental disruption, and the

potential for radical economic and social inequalities (Facer 2011). Marshall's (1950: 74) classic, definition of citizenship considers it as: "a status bestowed on those who are full members of a community. All who possess the status are equal with respect to the rights and duties which the status is endowed." Derivative of this, he distinguishes three kinds of citizenship that have developed in a sociohistorical trajectory over the course of the past two centuries: civil, political and social. It is evident that higher education has a part to play here in helping students to connect up knowledge with identities, statuses, rights and responsibilities. This has the potential to include many disciplines, and not just the social sciences. In this sense citizenship and the notion of graduate attributes can be related to a recognition of different identities as well as aspects that may be universal.

In this regard it is worth pointing out that the framing of teacher-learner relationships and associated rights and responsibilities is a key aspect in relation to learning activity (Tennant, McMullen & Kaczynski, 2010). This in effect means the creation of 'deliberate relationships' with students where the nature of rights and responsibilities change over time and through which they can claim greater power (Tom, 1997). This is based on a reflexive awareness of the purpose of the relationship as one of education. Key features of this are explaining to students how and why their learning activities have been designed, the establishment and negotiation of rights and responsibilities, and the analysis of power dynamics. Whilst these may seem somewhat high level aim, they translate into aspects such as assessment which for many lecturers is emotionally sensitive and intellectually demanding but for students can seem as if it is not only their learning that is being evaluated but also their developing personal identity (Light & Cox, 2001: 169).

It is also the case that not only students need to reflect upon their own cultural assumptions, academic staff also need to as well. For example, Murray and McConachy (2018: 3) write

'In fact, much of the literature on the internationalized classroom takes an interaction-centred view of participation for granted, and thus frequently treats students from non-Western backgrounds in stark – and, we would argue, quite superficial – terms as "difficult" students, based on the (frequently ethnocentric) perception that they are reluctant to speak, offer opinions, be critical, or contribute to or take the initiative in group work activities.'

They further go onto point out that participation is assumed to involve students in discussing and talking through points with one another in class and that academic staff "take it as given that participation is speaking out and that other less overt, non-verbal forms of engagement do not qualify as participation" Murray and McConachy (2018: 3). In other words, the cultural assumptions drawn upon by academic staff involve ethnocentric judgments of the cultural "other" and in so doing fail to recognize that 'participation' may also involve other modes of activity that do not assume the voicing of individual views or arguments. As Murray and McConachy report in their study of staff views on participation by students in terms of an intercultural class setting, while staff show a high degree of willingness to work across cultures and manage cultural differences in a positive way, they tend to focus on the 'other' in problematic terms due to lack of participation. Thus, participation in itself is a cultural act and one that needs to be engaged with in a reflexive manner by both staff and students.

These issues cannot be addressed without bringing into question strategies for teaching, learning and assessment, and how these impact on undergraduate programmes. For example, much of the graduate attributes literature stresses active learning or inquiry-based learning. However, the challenge is not only to provide students with a translation of their curriculum into learning activities but for those very activities to manifestly demonstrate their relevance to the internationalization of higher education Jones (2009) points out that generic attributes are very much context-dependent, and shaped by the disciplinary epistemology in which they are conceptualized and taught. Her study involved an examination of the teaching of generic attributes in physics, history, economics, medicine and law within two Australian universities. Skills such as critical thinking, analysis, problem solving and communication are conceptualized and taught in quite different ways in each of the disciplines, and of course are culturally dependent, most often associated with the Westernised notion of ‘independent learning’. Jones goes on to suggest that a re-disciplined theorizing of generic skills and attributes which frames them as part of the social practices within disciplines is required, one that integrates attributes within disciplinary epistemology. However, while agreeing with this position, it is also the case that disciplines do not sit outside of cultural contexts and therefore these contexts should also be considered.

Conclusion

The internationalization of higher education in its various forms offers the potential of engendering a wide range of qualities and skills. However, much of the focus to date has been in terms of an individualistic notion of graduate attributes and, more often than not, one that almost focuses upon employability. Whilst this aspect is important there is the danger of skewing the purpose of higher education as no more than a preparation for work. This paper has suggested that one way of avoiding this narrow focus is to consider the internationalization agenda as related to citizenship within the context of a globalized world and one of increasing intercultural contact. In a such a world is evident that national and local concerns and issues are not separable from wider global issues. While the internationalization agenda has been beneficial, it has nonetheless sometimes been loosely thought of as offering a good experience for local students to encounter people from other nations and cultures or through curricula that contain more international examples and perspectives. However, the educational benefit of this is difficult to achieve and requires careful thought around the issue of pedagogic assumptions that will lead to this outcome. The approach suggested in this paper is to broaden the focus of graduate attributes to include issues of internationalization and intercultural contact. This approach encourages both staff and students to consider the mutual relationship between self, discipline and culture as part of an ongoing communicative activity, rather than as simply an instrumental process. This is still a challenge in terms of how educators help students to acquire not only subject content, and not merely competencies, but a real engagement with how to evaluate and use knowledge in relation to issues of global citizenship.

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Reforms in Education – Example of Latvia

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Abstract

A leading Finnish educator Sahlberg states that globalization has become an influence in nation-states' social reforms as education sectors adjust to the new global environments that are characterized by flexibility, diversity, increased competition and unpredictable change (Sahlberg, 2002). Understanding the effects of rapidly changing world on teaching/learning process, teachers work and students involvement is essential for any policy maker, reform designer and educational leader.

Keywords: 21st century skills, teaching/learning process, demands for education

Main Conference Topic: Multidisciplinary Academic Conference on Education, Teaching and E-learning

Introduction

Twenty-first century students live in an interconnected, diverse and fast-changing world. Different forces like economy which is driven by knowledge and innovation, digitalization and new technologies, cultural, environmental, political and health challenges, competing marketplaces, social networking develop, influence and shape today's students future and their understanding and attitude towards surrounding world and education plays key role in it.

Education for the 21st century is a theme that has been discussed and explored for quite a long period of time and done it by many experts and organizations. In the rapidly evolving age of technology the key words education policymakers often use are competencies, skills, innovation. As Schleicher, director for Education and Skills, and Special Advisor on Education Policy, OECD, indicates that learning in the 21st century goes deeper and it is more abstract (Schleicher, 2015). Nowadays it is about how knowledge is generated and applied. What students learn, how they do it and how teachers teach them is changing. Teaching/learning process is no longer about reproducing content knowledge, it is about connecting prior knowledge to new one and then be able to use that in novel situations. Ausubel claims that 'the most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly' (Ausubel, 1968). By emphasizing the significance of connecting learning with a real world, students will become more motivated and informed and they start realizing that learning process also stretches far beyond the classroom.

Students of the 21st century

Today's students are different from those decades ago. Generation Z (born between 1995-2009) cannot imagine and live without the Internet, smartphones, iPads and other devices available throughout their childhood and schooling. Children of Alpha generation (born since 2010) are even younger than technologically advanced devices, and as Gerver stresses that

‘the issue is not that we have generations of children who don’t want to learn, the problem is that they don’t want to learn when they can’t see the point of learning.’(Gerver, 2012, p.21)

Prensky argues that today's students represent the first generations to grow up with this new technology and they think and process information fundamentally differently from their predecessors (Prensky, 2001). Children of these two generations are able to teach themselves about any topic they are interested in without even leaving their bedroom, they are digital natives comfortable using apps and code as they have born with that ability.

New Demands for Teaching/Learning Process

21st century teaching/learning process is unambiguously driven by need and desire to develop young people's ability to be more: creative, collaborative, flexible, responsive, adaptable, self-directed, innovative, responsible.

The traditional “3 Rs” – reading, writing and arithmetic – play a core role in the 21st century classroom, but nowadays those “content domains” become avenues for imparting a whole array of 21st century skills – skills that will allow students to function, learn and adapt throughout life (Walker, 2012).

The Partnership for 21st Century Skills (P21) indicates that in order to compete in the global economy young people need more than the 3 Rs, a new “4 Cs” are also required: critical thinking and problem solving, communication, collaboration, creativity and innovation. These four themes are not to be understood as units or even subjects, but as themes that should be overlaid across all curriculum mapping and strategic planning. They should be part of every lesson in the same way as literacy and numeracy.

Menten discusses not about skills but 21st century competencies:

- cognitive (academic) – mastery of core content as well as critical thinking, creativity,
- intrapersonal (emotional/personal) – attitudes and behaviors that influence how students apply themselves, including having a growth mindset, learning how to learn, being motivated to succeed,
- interpersonal (social) – competencies students need to relate to other people, communicate, collaborate, as well as leadership and global awareness (Menten, 2015).

To uncover the skills that meet the needs of a 21st century marketplace, meta-analysis of the research about 21st century skills in primary and secondary education was carried out and 16 skills in three broad categories were classified (World Economic Forum, 2015). The results of the analysis are given in Table 1.

Table 1: Results of meta-analysis

21st Century Skills		
Foundational Literacies How students apply core skills to everyday tasks	Competencies How students approach complex challenges	Character Qualities How students approach their changing environment
1. Literacy 2. Numeracy 3. Scientific literacy 4. ICT literacy 5. Financial literacy 6. Cultural and civic literacy	7. Critical thinking/problem-solving 8. Creativity 9. Communication 10. Collaboration	11. Curiosity 12. Initiative 13. Persistence/grit 14. Adaptability 15. Leadership 16. Social and cultural awareness

Nowadays economists and business people determine which skills and competencies schools should develop whereas educational scientists structure models how to meet those demands. In order to deepen and develop learning in all three dimensions – knowledge, skills and character – the fourth dimension – meta-learning (often called learning to learn – inner processes with the help of which people think and adapt the acquired in new situations) has been added. Meta-learning is a part of every subject and it can be defined as having two components - metacognition which is the process of thinking about thinking, and growth mindset which is each person's inner belief that abilities can be developed through hard work. It is learning how to learn continuously and always with a “can-do” attitude.

Ferriss's meta-learning ideas are combined into the process called DiSSS (Feloni, 2015):

- Deconstruction: Breaking down a skill, what are the bare minimum learnable components?
- Selection: Which 20% of these components should be focused on to give 80% of the desired outcomes?
- Sequencing: In what order should these units be learned to maximise outcomes and avoid failure?
- Stakes: What stakes can be created to push past difficulties and guarantee completion of learning?

Kivunja, having taken the domains of skills together, created ‘The New Learning Paradigm.’ To simplify an understanding of the new learning paradigm, Kivunja captured its essence into the formulation:

$$JR21CS = f(TCS + LIS + CLS + DLS).$$

The explanation of this formulation is the following:

JR21CS = Job Readiness With 21st Century Skills

f = is a function of

TCS = Traditional Core Skills

LIS = Learning and Innovation Skills

CLS = Career and Life

DLA = Digital Literacy Skills (Kivunja, 2014).

A very useful tool for planning teaching/learning process and defining the types of work that teachers want their students to do is a learning taxonomy. The most well-known is

Bloom's taxonomy which was developed in 1956 and revised by Andersen and Krathwohl in 2001. Other taxonomies such as Fink taxonomy of significant learning, Marzano's new taxonomy, Biggs SOLO taxonomy are also described (Dobbins, 2014). A common element of these other taxonomies is that they go beyond just the cognitive processes. Mainly one taxonomy – Bloom's – was used in various education systems, also in Latvia. In order to structure contemporary teaching/learning process and achieve results corresponding to the demands of the 21st century, Ozola recommends to complement Bloom's taxonomy with learning strategies, teachers' role and students' involvement (Illeris, 2009, Anderson, & Krathwohl, 2001, Bloom, 1956, Ozola, 20018). The model is given in Table 2.

Table 2: The Model of Learning Strategies, Taxonomy and Teacher's Role

Taxonomy			Learning strategies	Teacher
Knowledge construction	↑	Students gain new knowledge and skills as new values	<p>III. <u>Transformative learning</u> A student/a teacher</p> <hr/> <p>2.</p> <ul style="list-style-type: none"> ▪ A student generates new ideas and works creatively. ▪ A student learns to learn (lifelong learning). ▪ A student's personality changes or changes in the organisation of the self take place what demands a lot of mental energy. 	<p>A teacher acts as a manager of the learning process who:</p> <ul style="list-style-type: none"> - delegates the responsibility about learning to students, - plans activities of the learning process so that students come to new knowledge and skills themselves. <p>Learning dominates over teaching.</p>
		<p>Making conclusions and arguing</p> <hr/> <p>Analyzing and evaluation</p> <hr/> <p>Applying in new situations</p>	<p>Learning critically evaluating personal experience, opinions, assumptions, feelings and mental perspectives in order to create new and improved interpretations.</p> <hr/> <p>1.</p> <ul style="list-style-type: none"> ▪ A student is open to new knowledge. An openness is based on inner motivation. ▪ A student himself constructs and develops new knowledge, using already existing knowledge and experience. ▪ A student is able to solve practical life problems. 	
Knowledge acquisition	↑	Use in known/similar situations	<p>II. Learning by addition A student/a teacher</p> <ul style="list-style-type: none"> ▪ A new element explained by a teacher, is linked as an addition to a scheme or pattern that is already established (core subject acquisition at school – from elementary activities in primary school towards more complicated in elementary and secondary school.) ▪ If a content is corresponding then a student applies a new element easily, otherwise new knowledge has been forgotten fast. 	<p>A teacher has organized teaching/learning content in a system. Didactics. A student develops thinking skills in similar situations. A teacher has knowledge and skills in organizing teaching/learning process.</p> <p>Teaching dominates over learning.</p>
		Understanding		

		Remem-bering	I. Mechanical learning A teacher An isolated information, something new that is not a part of anything else.	A teacher gives the information what should be learned. He knows teaching/learning content what should be taught. Basics of methodology. Teaching.

The 21st century demands influence the role of a teacher's work. A teacher's profession is always viewed as a knowledge rich with teachers as 'learning specialists'. As to traditional understanding teachers can be expected to process and evaluate new knowledge relevant for their core subjects. But in time when new technologies enhance learning teachers cannot longer be the bearers of knowledge who must transmit content to students. Teachers of the 21st century are being characterized as brokers or facilitators who help create a 'culture of inquiry' and assist learners to navigate the web information, make interdisciplinary connections, and apply learning to real world problems (Hung et.al., 2012).

The point of view that teaching/learning approach should be student-centered is expressed by different learning theorists. The authors of this article would like to note that student-centered approach should be understood as such where the main stress is laid on learning and not on a student like a personality. Unfortunately, in Latvia a student-centered approach quite often is treated as a teaching/learning process where students have only rights and no responsibility for their learning and outcomes what results to losing motivation to learn. One way for teachers how to increase students' responsibility about their own learning is to make use of gradual release of responsibility model (GRR) (Pearson, & Gallagher, 1983). There are four interactive components of a gradual release of responsibility:

- 1) Focus lessons – they establish the purpose or intended learning outcome and clue students into standards they are learning.
- 2) Guided instruction – teachers prompt, question, facilitate and lead lead students through tasks that increase their understanding of the content.
- 3) Collaborative learning – it ensure that students practice and apply their learning while interacting with peers.
- 4) Independent work – provides students practice with applying information in new ways (Fisher, & Frey, 2008).

This model requires a shift of responsibility from the teacher assuming all the duty for performing a task to a situation in which students assume all the responsibility (Duke, & Pearson, 2002). GRR model is shown in Figure 1.

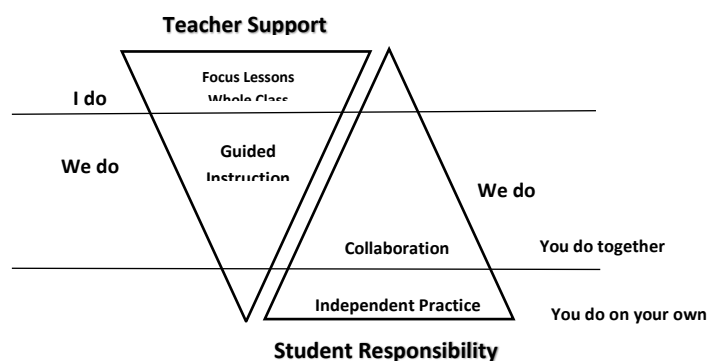


Figure 1: Gradual Release of Responsibility

Methodology and findings

In order to interpret trials of education system to satisfy the demand towards contemporary education, the authors of the article made analysis of the published results of the project 'Skola2030' (School2030) worked out by National Centre for Education of the Republic of Latvia and according to that also analysed the results of another inquiry carried out by the authors of this article where more than 800 teachers from the whole Latvia were involved.

Demands towards students and education systems develop rapidly. If earlier education was about teaching then nowadays it is about being successful in global economy's world. A century ago teachers could expect that what they had taught to their students would be essential the whole life. Today nobody can foresee how things will develop even during next ten or twenty years. Schools have a totally new task - to prepare students for life in the world of fast economic, social, environmental and cultural changes; for technologies and working places which still will be created and for solving such problems about which nobody knows yet. The question that arises from this is how to educate motivated, flexible and willing to learn students? Today's education is more about creativity, critical thinking, communication and cooperation, use of ICT and such character qualities which allow people live and work together (Schleicher, 2017).

Many nations in the world have undertaken reforms of curriculum, teaching and learning, and assessment with the intention to prepare students better for all those education demands set up by the 21st century. At present Latvia also faces a new education reform which is going to start from the study year 2018/2019 when a gradual transition to an improved teaching/learning content and a corresponding teaching approach will take place in preschools and schools (from the age of 1.5 up to 18) in Latvia.

The goal of the project "Approach of Competencies in Teaching/Learning Content", implemented by National Centre for Education, is to develop appropriate and continuously introduce such a content of general secondary education and approach towards teaching/learning process which will enable students to gain the knowledge, skills and attitudes necessary for life in the 21st century (Skola2030, 2017) (School2030). Having done the analysis of theoretical resources, as well as the analysis of the results of the inquiry about the participation in the project it is acknowledgeable that at the beginning of 2017 National Centre for Education selected one hundred preschools and schools as project's pilot schools. These schools are the first ones in which both a new content and a teaching approach will be

approved for two years. In January 2018 the inquiry of 100 pilot schools was carried out and the feedback about benefits from taking part in the approbation process given. The questions in the questionnaire were asked from three standpoints:

- 1) I know – respectively, participants' evaluation about acquired and learned in seminars, trainings, activities.
- 2) I do – to what extent new knowledge, skills, methods and experience are used in everyday work at school.
- 3) Satisfaction in general about the participation in the project.

The participants reflected that the main benefits were more deep understanding about students meaningful learning (64%), active participation in interrelated learning process (68%), cooperation with colleagues from other schools and a chance to get new experience (90%), greater support from own school administration (91%). In order to manage a teaching/learning process appropriate for each student's needs, it is essential teachers to set reachable learning outcomes. The feedback from the teachers about this issue was that they know how to do it (87%), they select and use meaningful tasks which demand thinking, are manifold and various in difficulty (93%), they give positive feedback (89%), promote students to think about their learning, plan and manage their time (77%).

Another activity, a discussion, was organized to obtain views about what school graduates need more – knowledge or skills. A common view was expressed by all participants that graduates should have basic knowledge in different subjects, as well as skills to use that knowledge. Entrepreneurs stressed that students need independent learning skills and schools have to teach students to be able to adapt to new life situations, solve problems and develop inner motivation to learn not only at school but the whole life. The entrepreneurs strongly supported the idea that the teaching/learning content should include the development of students critical and analytical thinking, meaningful reading literacy, logical thinking and ability to formulate and express own standpoints. The global world needs active not passive citizens.

Having done analysis of a wider-range inquiry where more than 800 teachers of various schools in all regions of Latvia were surveyed, it is evident that it is quite a challenge to make teachers understand and accept changes and new trends if they are worked in a traditional manner for years. To make it happen first teachers have to alter their thinking. Another essential point of view held by all teachers is that teachers need high quality courses to raise their professional qualification. In fact availability of such courses is quite a problem in Latvia. What refers to the project 'Skola 2030' (School 2030), it is obvious that there is also a lack of resources and time to train and teach all teachers in Latvia not only those from pilot schools how to implement a new reform.

Conclusions and implications

1. The 21st century education is about giving students the skills they need to succeed in a rapidly changing world, and helping them grow the confidence to practice those skills.
2. The students in schools today are intelligent, independent and extremely capable. They are skilled with technology and comfortable with global and intercultural communication.
3. In order to be able to thrive in the 21st century learners have to have ability to learn how to learn, engage in deep learning, develop skills and competencies, whereas teachers – design for learning rather than plan for teaching, develop comprehensive repertoire of strategies and help students learn to learn.

4. Teachers must have a deep understanding how learning happens in general and of individual students.
5. Teachers are to help students to develop more advanced knowledge, skills and competencies that go beyond just learning of facts from the textbooks.
6. Every education reform needs resources, time and complete understanding of the involved parties to be successful.
7. Teachers are willing to take part in seminars, trainings and courses only if those activities are meaningful and useful in their everyday work.

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Can CAI Improve Reading Achievement in Young ELL Students?

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Abstract

This study explored the effectiveness of a comprehensive computer-adaptive reading program of teaching kindergarten and second grade students' early reading concepts; specifically, the impact on early literacy skills of English Language Learners (ELL). Students attended two different districts in Texas and Florida during the 2015-2016 school year. The experimental groups used the CAI program, and the control groups either had low usage of the CAI program or did not use the CAI program depending on the district. Analyses revealed the ELL students in the experimental group outperformed students in the control group on standardized literacy assessments. These results indicate that the use of a CAI program in addition to the traditional classroom setting could have a great impact on early literacy skills, especially for students that are learning English as a second language.

Keywords: CAI, Literacy, ELL, Early Childhood Education

Main Conference Topic: Research on Technology in Education

Introduction

English Language Learners (ELL), students learning English as their second language in school, account for a significant and increasing percentage of the American student body (National Center for Education Statistics [NCES], 2015). In the 2013-2014 school year, over 4 million students, 9.3 percent of students attending public schools, participated in programs for ELL education and were assimilating into a new language and a new culture. In recent history, the percentage of the student body accounted for by ELL students has risen by as much as 10 percent, and there has been a corresponding increase in funding directed towards ELL programs in this same period (Horsford & Sampson, 2013). ELL students are, contrary to what may be the popular conception, not a homogenous group. Linguistic backgrounds for ELL students in the United States are drawn from all around the globe, and, while the majority are Spanish speaking, Korean, Vietnamese, Russian, Chinese, and many others are also represented (Office of English language Acquisition [OELA], 2015).

Young ELL students are likely to suffer from a number of disadvantages throughout their academic career in comparison to their peers. ELL status is correlated with low academic achievement as well as low socioeconomic status (Kanno & Cromley, 2013). In elementary school a typical student learns how to learn, acquiring the foundational building blocks for academic success. A young ELL student has to do the same thing while, at the same time, acquiring a new and unfamiliar language. For many students this process can start from the ground up with an entire new alphabet (Levitan, Mathison, & Billings, 2010). First generation ELL students may find it difficult to both practice this new language at home and

receive help from their parents or guardians (Castañeda, Rodriguez-Gonzalez, Schultz, 2011). By middle school a disproportionate percentage of ELL students fail to meet a basic level of reading proficiency (NCES], 2015). Compared to English proficient students, ELL students are more likely to drop out of high school and half as likely to achieve a bachelor's degree (Kanno & Cromley, 2013).

ELL status can isolate students. ELL students can miss out on contextual information and nuance that would be evident to a native speaker (Munro & Derwing, 1995). An ELL student's education might be impeded by unfamiliarity with a teacher's accent or another student's diction. Difficulty communicating with the class can make it harder to engage with a lesson, and difficulty communicating with a teacher can make it harder to get meaningful feedback. Outside of the classroom, ELL students are less likely to participate in academic or artistic extracurricular activities (Lariviere, 2016). By the end of high school an ELL student will be half as likely to participate in a musical ensemble as non-ELL students (Elpus & Abril, 2011).

Sheltered Instruction Observation Protocol (SIOP) is an example of a validated approach to educating ELL students by directly addressing the isolating effect of not speaking the lingua franca (Echevarria, Vogt, & Short, 2013). SIOP seeks to engage the student in the lesson plan. The approach calls for tailoring material to the individual student's level of competency, as well as providing them with regular opportunities for interaction and meaningful feedback. SIOP has a demonstrated track record of increasing academic success (Echevarria, Vogt, & Short, 2013). There are interesting parallels that can be drawn between the strengths of SIOP and the structural benefits of computer-assisted instruction (CAI). Like SIOP, CAI facilitates engagement with the curriculum and can provide individualized performance-appropriate lesson plans for each student. Also like SIOP, CAI has been demonstrated to increase academic achievement for ELL students. Research has shown ELL students instructed with CAI to be more engaged with the material than control students instructed with a traditional curriculum (Billings & Mathison, 2012). Randomized trials have shown that students receiving CAI augmented education have better post-test performances on literacy measures compared to students using strictly conventional approaches (Al-Mansour & Al-Shorman, 2009). Students receiving computer-assisted language learning tend to outperform their peers receiving traditional instruction on reading comprehension measures (Marzban, 2011).

Emerging technologies are also taking the education of ELL students out of the classroom. The use of mobile devices, such as cell phones and tablets, in English language education is becoming more widespread as those technologies become increasingly accessible (Kukulska-Hulme, Norris, & Donohue, 2015). These mobile approaches have been shown to rapidly improve linguistic skills such as spelling, grammar, and vocabulary (Chinnery, 2006). Recent research into a web-based multi-media platform designed to teach grammatical skills showed that the technology produced a conducive environment by entertaining, engaging, and educating its users (Baturay, Daloglu, & Yildirim, 2010). The use of CAI remains a relatively new approach to educating ELL students, and further research is necessary in order to ensure that these emerging technologies are leading to better learning outcomes.

Methods

Participants

District 1. The first district consisted of 3,326 students enrolled in a public school district in Texas during the 2015-2016 school year. Approximately 40% of the students in the district are Hispanic, 30% are Caucasian, and 15% are African American.

District 2. The second district consisted of 3,589 kindergarten and second grade students enrolled in a public school district in Florida during the 2015-2016 school year. The majority of students in the district are Hispanic or Caucasian, and approximately one-half of the students qualify for free lunch.

Materials

Computer-adaptive Software. The program offers a comprehensive, computer-adaptive pre-reading and reading curriculum for pre-kindergarten through second grade students. The software presents a wide range of multimedia-based activities in an adaptive sequence tailored to each student's initial placement and his or her individual rate of growth throughout the complete reading curriculum.

The Texas Primary Reading Inventory (TPRI). The TPRI is an early reading assessment designed to identify the reading development of students in kindergarten through third grade and is administered to students individually. The test identifies students that are at risk for reading difficulties and sets learning objectives for these students.

VLT. The VLT is a county reading and writing test used to determine a student's instructional level in reading and writing according to Florida State Standards in kindergarten, first grade, and second grade.

Procedure

Kindergarten experimental students were expected to use the adaptive curriculum for fifteen minutes per day, five days per week throughout the 2015-2016 school year, and second grade experimental students were expected to use the adaptive curriculum for thirty minutes per day, five days per week throughout the 2015-2016 school year.

In the first district, the TPRI was administered at the beginning and end of the year. In the second district, the VLT was administered at the end of the 2015-2016 school year.

Findings

District 1

Kindergarten

The analysis includes students that participated in the TPRI test at the beginning and at the end of the year. The experimental group for kindergarten ($n = 212$) consisted of students who used the adaptive curriculum throughout the 2015-2016 school year. The control group ($n = 1,484$) consisted of students who did not use the adaptive curriculum during the 2015-2016 school year, but instead received traditional in-class literacy instruction instead for the same amount of time that the experimental group received CAI instruction. Thus, overall exposure to literacy instruction was the same for both groups.

Group Differences Using Independent Samples *t*-tests. Independent samples *t*-tests examining gains from beginning of year scores to end of year scores were conducted (Table 1).

Letter Name Identification. Analysis of gains revealed a significant difference between groups $t(1, 438) = -5.74, p < .01$ due to higher gains made by students in the experimental group ($M = 12.03$) than by control students ($M = 5.63$). Effect size ($d = 0.74$).

Letter to Sound Linking. Analysis of gains revealed a significant difference between groups $t(1, 301) = -2.51, p < .05$ due to higher gains made by students in the experimental group ($M = 4.63$) than by control students ($M = 2.80$). Effect size ($d = 0.51$).

Inferring Word Meaning. Analysis of gains revealed a significant difference between groups $t(1, 1663) = -4.54, p < .01$ due to higher gains made by students in the experimental group ($M = 0.23$) than by control students ($M = 0.05$). Effect size ($d = 0.34$).

Linking Details. Analysis of gains revealed a significant difference between groups $t(1, 1672) = -6.68, p < .01$ due to higher gains made by students in the experimental group ($M = 0.11$) than by control students, who decreased in score on average ($M = -0.35$). Effect size ($d = 0.49$).

Recalling Details. Analysis of gains revealed a significant difference between groups $t(1, 1670) = -4.01, p < .01$ due to higher gains made by students in the experimental group ($M = 1.58$) than by control students ($M = 1.36$). Effect size ($d = 0.30$).

Listening Comprehension Total Score. Analysis of gains revealed a significant difference between groups $t(1, 1570) = -7.74, p < .01$ due to higher gains made by students in the experimental group ($M = 1.96$) than by control students ($M = 1.07$). Effect size ($d = 0.58$).

Table 1: District 1 Overall Kindergarten TPRI Gains by Substrand

	Experimental			Control			<i>p</i>
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	
Letter Name Identification	12.03	8.51	71	5.63	8.61	369	.00**
Letter to Sound Linking	4.63	3.41	27	2.80	3.63	276	.01*
Inferring Word Meaning	0.23	0.65	207	0.05	0.51	1458	.00**
Linking Details	0.11	1.03	211	-0.35	0.92	1463	.00**
Recalling Details	1.58	0.82	210	1.36	0.74	1462	.00**
Listening Comprehension Total	1.96	1.56	201	1.07	1.51	1371	.00**

Group Differences by ELL Status Using Two-Way ANOVAs. Two-way ANOVAs were conducted to examine the effects of the adaptive curriculum on gains by ELL status for each substrand (Table 2).

Letter Name Identification. There was no significant interaction between the effects of ELL status and the adaptive curriculum on Letter Name Identification gains, $F(1, 436) = 1.84, p = .176$. Simple effects analysis showed that ELL students' gains in the experimental group were slightly higher than in the control group, but the difference was not significant.

Inferring Word Meaning. There was no significant interaction between the effects of ELL status and the adaptive curriculum on Inferring Word Meaning gains, $F(1, 1661) = 0.72, p = .397$. Simple effects analysis showed that ELL students in the experimental group significantly outperformed students in the control group.

Linking Details. There was no significant interaction between the effects of ELL status and the adaptive curriculum on Linking Details gains, $F(1, 1670) = 0.31, p = .576$. Simple effects analysis showed that ELL students in the experimental group significantly outperformed students in the control group.

Recalling Details. There was no significant interaction between the effects of ELL status and the adaptive curriculum on Recalling Details gains, $F(1, 1668) = 0.57, p = .451$. Simple effects analysis showed that ELL students in the experimental group significantly outperformed students in the control group.

Listening Comprehension Total. There was no significant interaction between the effects of ELL status and the adaptive curriculum on Listening Comprehension Total gains, $F(1, 1568) = 0.05, p = .832$. Simple effects analysis showed that ELL students in the experimental group significantly outperformed students in the control group.

Table 2: District 1 Overall Kindergarten TPRI Gains by ELL Students

	Experimental			Control			<i>p</i>
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	
Letter Name Identification	6.86	7.98	14	3.42	7.45	59	.18
Inferring Word Meaning	0.33	0.61	43	0.08	0.56	175	.01**
Linking Details	0.43	1.17	44	0.09	1.06	176	.03*
Recalling Details	1.82	0.92	44	1.53	0.81	177	.02*
Listening Comprehension Total	2.57	1.71	42	1.70	1.70	167	.00**

Second Grade

The analysis includes students who participated in the TPRI test at the beginning and at the end of the year. The experimental group for second grade ($n = 138$) consisted of students who used the adaptive curriculum throughout the 2015-2016 school year. The control group ($n = 1,492$) consisted of students who did not use the adaptive curriculum during the 2015-2016 school year, but instead received traditional in-class literacy instruction instead for the same amount of time that the experimental group received CAI instruction. Thus, overall exposure to literacy instruction was the same for both groups.

Group Differences Using Independent Samples *t*-tests. Independent samples *t*-tests examining gains from beginning of year scores to end of year scores were conducted (Table 3).

Graphophonemic Knowledge - Set 1. Analysis of gains revealed a significant difference between groups $t(1, 1604) = -3.51, p < .01$ due to higher gains made by students in the experimental group ($M = 1.26$) than by control students ($M = 0.88$). Effect size ($d = 0.31$).

Word Reading - Set 1. Analysis of gains revealed a significant difference between groups $t(1, 1437) = -6.84, p < .01$ due to higher gains made by students in the experimental group ($M = 1.23$) than by control students ($M = 0.55$). Effect size ($d = 0.64$).

Word Reading - Set 2. Analysis of gains revealed a significant difference between groups $t(1, 1448) = -5.62, p < .01$ due to higher gains made by students in the experimental group ($M = 1.67$) than by control students ($M = 0.98$). Effect size ($d = 0.51$).

Word Reading - Set 3. Analysis of gains revealed a significant difference between groups $t(1, 1453) = -3.68, p < .01$ due to higher gains made by students in the experimental group ($M = 1.55$) than by control students ($M = 1.09$). Effect size ($d = 0.34$).

Word Reading - Set 4. Analysis of gains revealed a significant difference between groups $t(1, 1453) = -2.79, p < .01$ due to higher gains made by students in the experimental group ($M = 1.65$) than by control students ($M = 1.27$). Effect size ($d = 0.26$).

Table 3: District 1 Overall Second Grade TPRI Gains by Substrand

	Experimental			Control			<i>p</i>
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	
Graphophonemic Knowledge -Set 1	1.26	1.32	136	0.88	1.21	1470	.00**
Word Reading - Set 1	1.23	1.26	126	0.55	1.04	1313	.00**
Word Reading - Set 2	1.67	1.50	131	0.98	1.32	1319	.00**
Word Reading - Set 3	1.55	1.35	131	1.09	1.36	1324	.00**
Word Reading - Set 4	1.65	1.46	131	1.27	1.50	1324	.01**

Group Differences by ELL Status Using Two-Way ANOVAs. Two-way ANOVAs were conducted to examine the effects of the adaptive curriculum on gains by ELL status for each substrand (Table 4).

Graphophonemic Knowledge - Set 1. There was no significant interaction between the effects of ELL status and the adaptive curriculum on Graphophonemic Knowledge - Set 1 gains, $F(1, 1602) = 1.97, p = .161$. Simple effects analysis showed that ELL students in the experimental group significantly outperformed students in the control group.

Word Reading - Set 1. There was a significant interaction between the effects of ELL status and the adaptive curriculum on Word Reading - Set 1 gains, $F(1, 1435) = 4.78, p < .05$. Simple effects analysis showed that ELL students' gains in the experimental group were slightly higher than in the control group, but the difference was not significant.

Word Reading - Set 2. There was no significant interaction between the effects of ELL status and the adaptive curriculum on Word Reading - Set 2 gains, $F(1, 1446) = 0.08, p = .781$. Simple effects analysis showed that ELL students in the experimental group significantly outperformed students in the control group.

Word Reading - Set 3. There was no significant interaction between the effects of ELL status and the adaptive curriculum on Word Reading - Set 3 gains, $F(1, 1451) = 2.55, p = .111$. Simple effects analysis showed that ELL students' gains in the experimental group were slightly higher than in the control group, but the difference was not significant.

Table 4: District 1 Overall Second Grade TPRI Gains by ELL Students

	Experimental			Control			<i>p</i>
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	
Graphophonemic Knowledge - Set 1	1.41	1.23	34	0.73	1.15	175	.00**
Word Reading - Set 1	0.93	1.41	27	0.69	1.30	160	.28
Word Reading - Set 2	1.55	1.43	31	0.91	1.38	160	.02*
Word Reading - Set 3	1.13	1.45	31	1.03	1.29	160	.71

District 2

Kindergarten

The experimental group for kindergarten ($n = 1,287$) included students who used the adaptive curriculum for more than 1,000 minutes throughout the 2015-2016 school year. The control group ($n = 43$) included students who used the adaptive curriculum for less than 500 minutes throughout the 2015-2016 school year. Students in the control group received traditional literacy instruction in the remaining time.

Group Differences Using an Independent Samples *t*-test. An independent samples *t*-test examining group differences in VLT end of year scores between the experimental group and the control group was conducted (Table 5). Analysis of end of year scores revealed a significant difference between groups, $t(1, 1328) = -1.97, p < .05$, due to higher end of year scores made by the experimental students ($M = 79.35$) than the control students ($M = 72.56$). Effect size ($d = 0.31$).

Group Differences by ELL Status Using a Two-Way ANOVA. A two-way ANOVA was conducted to examine the effects of the adaptive curriculum on VLT end of year scores by ELL status (Table 6). There was no significant interaction between the effects of ELL status and the adaptive curriculum on VLT end of year scores, $F(1, 1326) = 3.57, p = .059$. Simple effects analysis showed that for ELL students, students in the experimental group significantly outperformed students in the control group.

Second Grade

The experimental group for second grade ($n = 2,150$) included students who used the adaptive curriculum for more than 1,200 minutes throughout the 2015-2016 school year. The control group ($n = 109$) included students who used the adaptive curriculum for less than 500 minutes throughout the 2015-2016 school year. Students in the control group received traditional literacy instruction in the remaining time.

Group Differences Using an Independent Samples *t*-test. An independent samples *t*-test examining group differences in VLT end of year scores between the experimental group and the control group was conducted (Table 5). Analysis of end of year scores revealed a significant difference between groups, $t(1, 2257) = -2.57$, $p < .05$, due to higher end of year scores made by the experimental students ($M = 71.24$) than the control students ($M = 66.19$). Effect size ($d = 0.25$).

Group Differences by ELL Status Using a Two-Way ANOVA. A two-way ANOVA was conducted to examine the effects of the adaptive curriculum on VLT end of year scores by ELL status (Table 6). There was no significant interaction between the effects of ELL status and the adaptive curriculum on VLT end of year scores, $F(1, 2255) = 0.01$, $p = .913$. Simple effects analysis showed that ELL students' end of year scores in the experimental group were slightly higher than in the control group, but the difference was not significant.

Table 5: District 2 Overall VLT End of Year Scores

	Experimental			Control			<i>p</i>
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	
Kindergarten	79.35	22.06	1287	72.56	26.91	43	.05*
Second Grade	71.24	20.02	2150	66.19	20.48	109	.01*

Table 6: District 2 VLT End of Year Scores by ELL Students

	Experimental			Control			<i>p</i>
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	
Kindergarten	69.65	24.42	172	50.00	32.07	8	.01*
Second Grade	63.78	21.08	365	58.59	20.81	22	.23

Conclusions

The purpose of the current study was to evaluate the efficacy of CAI on developing early literacy skills for English Language Learner students. These students typically come to school having to learn a second language, making learning how to read and write a longer and more challenging process than their native English-speaking peers experience. ELL students demonstrated dramatic improvements in learning skills following use of CAI-enhanced curriculum: Use of CAI consistently increased performance on reading metrics. The current study demonstrated this exhaustively by assessing results in terms of gain scores and end of year scores while controlling for beginning of year scores. In all cases, students receiving CAI curriculum had better learning outcomes than students receiving traditional, teacher-directed lessons. These findings are consistent with, and extend the findings of, previous research which pointed to better learning outcomes coinciding with the use of CAI (Saine, Lerkkanen, Ahonen, Tolvanen, & Lyytinen, 2010).

ELL students using CAI outperformed students in control groups on reading-related measures. Students in the experimental condition demonstrated greater gain scores for Inferring Word Meaning, Linking Details, Recalling Details, and Graphophonemic Knowledge. Students in the experimental group also outperformed the control group on multiple word reading sets. ELL students did not significantly improve on all metrics, but

there was improvement on the majority of the reading skill metrics assessed. The current findings support the hypothesis that implementing adaptive CAI software into curricula can help ELL students improve their English skills in the classroom setting, with the hopes of preventing them from being isolated or being disadvantaged in any way in the classroom.

Limitations of the current study should be acknowledged. While a cross section of grades from multiple school districts was employed, no longitudinal data was gathered. The current study argues that CAI offers benefits to ELL students, but these findings cannot be extended longitudinally. Further research could benefit from exploring whether the benefits of early CAI education are sustained into middle school and beyond. Additionally, longitudinal data could explore the relative efficacy of multiple years of CAI curriculum taken together.

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Technology in Early Childhood Education: Long-Term Effects

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Abstract

Students in a school district in Maryland were given a computer-assisted instruction (CAI) supplemental literacy program. Literacy scores of students who used the CAI program for at least one year in kindergarten (2015-2016 school year) or in kindergarten and first grade (2016-2017 school year) were compared to literacy scores of students who did not use the CAI program in either year. Students who used CAI for two years significantly outperformed students who did not use CAI on all five literacy strands. Additionally, students who used CAI for only one year prior to testing scored higher than students who did not use CAI. This longitudinal study indicates that more years of usage of CAI lead to significantly higher literacy scores, making a positive impact on early literacy skills of early elementary school students.

Keywords: CAI, Literacy, Early Childhood, Technology
Main Conference Topic: Educational Technology

Introduction

In recent decades, education has increasingly been incorporating computer technology, involving a shift from expecting children to be functionally literate to a more social definition of literacy (Bebell, O'Dwyer, Russell, & Hoffmann, 2010; Clinton, Purushotma, Robison, & Weigel, 2009; Van Kleeck & Schuele, 2010). A 2003-2009 literature review called for more innovative ways to bridge literacy, technology, and learning, since digital texts and technology are becoming intertwined with early literacy skills (Burnett, 2010). Half a decade later, investments are being made in technology more rapidly than ever before: In the first half of 2015 in the United States, \$2.5 billion in education technology deals were counted, which is greater than the total for the year of 2014 ("Investments in education," 2015). This monetary shift coincides with a cultural shift towards technology: Students need to develop traditional literacy skills so that they can communicate, as well as cultural and social skills so that they can carry on with media literacies in this digital age (Clinton, Purushotma, Robison, & Weigel, 2009; Cummins, 2014). Additionally, students are expected to not only be able to read and write, but to have analytical skills, creative skills, and social skills beyond literacy (Clinton, Purushotma, Robison, & Weigel, 2009; Van Kleeck & Schuele, 2010). These skills are more likely to be developed in children who grow up in homes with access to these technologies from birth; when children enter school, curricula need to provide equal opportunities for children regardless of background. In this digital age where humans are globally connected, technology needs to be continually improved and made equally accessible so that students are successful in school and can develop the necessary skills to thrive in today's society (Collins & Halverson, 2009; Laborda, Uzunboylyu, & Ross, 2016).

Early reading skills, among other social and academic skills, are predictors for future academic success (Rabiner, Godwin, & Dodge, 2016). Literacy is difficult to attain in the early years, and when not attained by the fourth grade, literacy below grade expectancy can negatively impact a student's educational trajectory (Suhr, Hernandez, Grimes, & Warschauer, 2010). Previous research also emphasizes that it is crucial to identify children who need intervention as early as possible in order to assist all students with their academic success (Navarro et al., 2012). Technology could be the answer to low literacy rates in school across backgrounds: Individualized instruction with remote literacy coaches for the teachers can potentially improve students' skills, but with small effects (Amendum, Vernon-Feagans, & Ginsberg, 2011; Clements et al., 2011). More meaningful studies on technology are necessary, as less credible research has not shown technology to create lasting impacts on all students (Bebell, O'Dwyer, Russell, & Hoffmann, 2010).

More rigorous educational research is needed in order to ensure that literacy and technology are incorporated into the educational system faultlessly (Burnett, 2010; Cheung & Slavin, 2011). Longitudinal research offers a robust approach for showing the long-term effects of any given treatment. Previous longitudinal research acknowledges the importance of early education: Out of students given one, two, or three years of individualized reading instruction from first through third grade, the students showing the strongest reading skills at the end of third grade received three years of instruction (Connor et al., 2013). On the other hand, longitudinal research into specific technology focused interventions has yielded mixed results (Clements et al., 2011). Students who used Building Blocks mathematics curriculum in preschool (experimental group) were compared to preschool students who did not (control group); at the end of preschool, the experimental group outperformed the control group with small effects, but by the end of first grade, the experimental students were performing the same as the control group. Studies have shown that technology in education is beneficial, but, despite the rapid cultural shift towards educational technology, these studies typically do not show meaningful or long-lasting effects (Bebell, O'Dwyer, Russell, & Hoffmann, 2010; Cheung & Slavin, 2011; Suhr, Hernandez, Grimes, & Warschauer, 2010). As the incorporation of technology in the classroom will undoubtedly continue to increase, more high-quality studies are needed to set students up for educational success with research-proven means.

In the current study, literacy scores of students who used computer-assisted instruction (CAI) technology for one year or two years are compared to literacy scores of students who had no CAI usage. Literacy scores of students who used CAI technology during kindergarten only, kindergarten and first grade, and students who did not use CAI technology either year were compared at the end of first grade. It is hypothesized that use of educational technology in two successive years as well as one year after using CAI will result in higher literacy scores and, ultimately, greater success in school than students who used CAI for less than two years.

Methods

Participants

Students attended a school district in Maryland. The sample was 49.1% Hispanic, 46.2% African American, 2.3% Caucasian, and 1.4% Asian, with Native American, Native Hawaiian or Pacific Islander, and Multiracial students each accounting for less than 1% of the sample. The sample was 48.6% female and 51.4% male. For two years of usage compared to no usage, the experimental group ($n = 3,086$) included students who used the adaptive curriculum during the 2015-2016 (kindergarten) and the 2016-2017 (first grade) school year. The control group ($n = 867$) included students who did not use the adaptive curriculum. For

one year of usage compared to no usage, the experimental group ($n = 501$) included students who used the adaptive curriculum during the 2015-2016 (kindergarten) school year and not during the 2016-2017 (first grade) school year. The control group ($n = 867$) included students who did not use the adaptive curriculum.

Materials

Computer-adaptive Software

The program offers a comprehensive, computer-adaptive pre-reading and reading curriculum for kindergarten through second grade students. The software presents a wide range of multimedia-based activities in an adaptive sequence tailored to each student's initial placement and his or her individual rate of growth throughout the complete reading curriculum.

Procedure

Kindergarten experimental students were expected to use the adaptive curriculum for fifteen minutes per day, five days per week, and first grade experimental students were expected to use the adaptive curriculum for thirty minutes per day, five days per week. Usage was tracked within the program and monitored weekly, and total minutes of the adaptive curriculum usage for the school year per group was calculated. Students in the control group received traditional literacy instruction for the same amount of time that the experimental group received CAI instruction. Thus, overall exposure to literacy instruction was the same for all groups. A literacy assessment was administered to all students at the end of the 2016-2017 (first grade) school year.

Results

Two Years of Usage Compared to No Usage

The experimental group included students who used the adaptive curriculum during kindergarten and first grade. The control group included students who did not use the adaptive curriculum. End of first grade scores were analyzed.

Group Differences Using Independent Samples t -tests

Independent samples t -tests examining group differences in end of year scores between the experimental group and the control group were conducted (see Figures 1 & 2).

Letter Identification. Analysis of Letter Identification end of year scores revealed a significant difference between groups, $t(1, 842) = -6.15$, $p < .01$, due to higher end of year scores made by experimental students ($M = 53.63$) than by control students ($M = 51.60$). Effect size ($d = 0.25$).

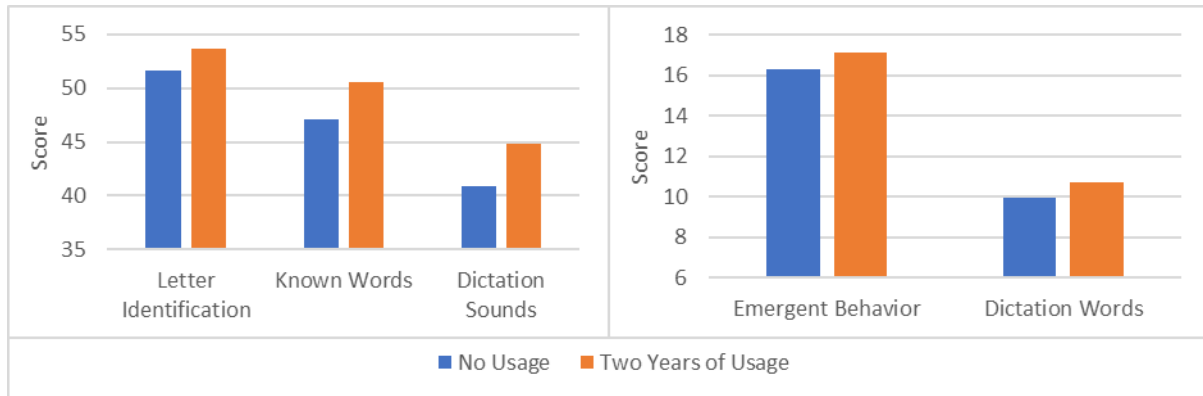
Known Words. Analysis of Known Words end of year scores revealed a significant difference between groups, $t(1, 1080) = -4.62$, $p < .01$, due to higher scores made by experimental students ($M = 50.55$) than by control students ($M = 47.12$). Effect size ($d = 0.18$).

Emergent Behavior. Analysis of Emergent Behavior end of year scores revealed a significant difference between groups, $t(1, 894) = -6.41$, $p < .01$, due to higher scores made by experimental students ($M = 17.14$) than by control students ($M = 16.28$). Effect size ($d = 0.26$).

Dictation Sounds. Analysis of Dictation Sounds end of year scores revealed a significant difference between groups, $t(1, 1020) = -6.94$, $p < .01$, due to higher scores made

by experimental students ($M = 44.85$) than by control students ($M = 40.85$). Effect size ($d = 0.28$).

Dictation Words. Analysis of Dictation Words end of year scores revealed a significant difference between groups, $t(1, 1111) = -4.59$, $p < .01$, due to higher scores made by experimental students ($M = 10.73$) than by control students ($M = 9.92$). Effect size ($d = 0.18$)



Figures 1. & 2. Two Years of Usage vs. No Usage - End of First Grade Scores by Substrand

Group Differences by Ethnicity Using ANOVAS

Two-way ANOVAs were conducted to examine the effects of the adaptive curriculum and ethnicity on each substrand of end of year scores (see Figures 3 & 4).

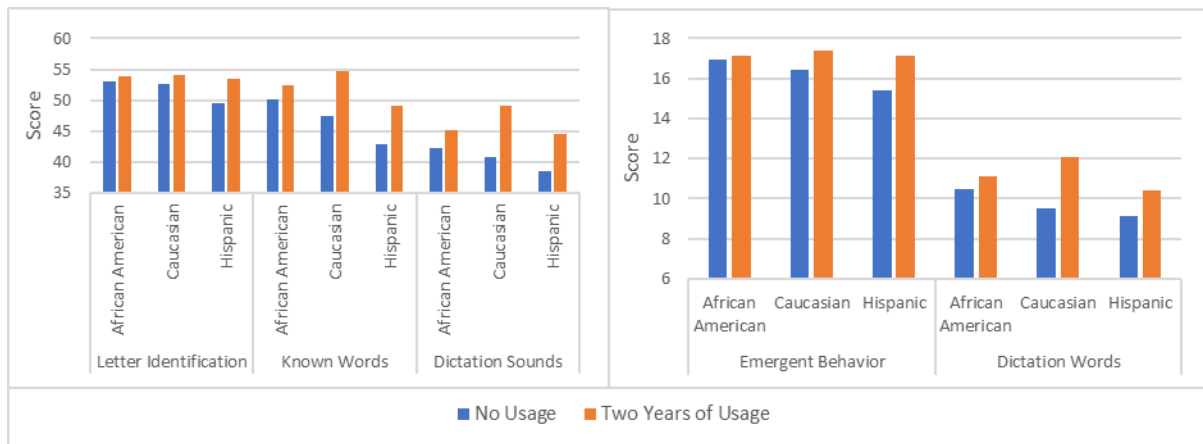
Letter Identification. There was a significant interaction between the effects of ethnicity and the adaptive curriculum on Letter Identification end of year scores, $F(6, 3617) = 11.49$, $p < .01$. Simple effects analysis showed that for African American and Hispanic students, the experimental group significantly outperformed the control group. Caucasian students in the experimental group scored slightly higher than students in the control group, but the difference was not significant.

Known Words. There was a significant interaction between the effects of ethnicity and the adaptive curriculum on Known Words end of year scores, $F(6, 3643) = 3.14$, $p < .01$. Simple effects analysis showed that for African American, Caucasian, and Hispanic students, the experimental group significantly outperformed the control group.

Emergent Behavior. There was a significant interaction between the effects of ethnicity and the adaptive curriculum on Emergent Behavior end of year scores, $F(6, 3602) = 13.15$, $p < .01$. Simple effects analysis showed that for Hispanic students, the experimental group significantly outperformed the control group. African American and Caucasian students in the experimental group scored slightly higher than students in the control group, but the differences were not significant.

Dictation Sounds. There was a significant interaction between the effects of ethnicity and the adaptive curriculum on Dictation Sounds end of year scores, $F(6, 3566) = 2.11$, $p < .05$. Simple effects analysis showed that for African American, Caucasian, and Hispanic students, the experimental group significantly outperformed the control group.

Dictation Words. There was no significant interaction between the effects of ethnicity and the adaptive curriculum on Dictation Words end of year scores, $F(6, 3572) = 1.52$, $p = .166$. Simple effects analysis showed that for African American, Caucasian, and Hispanic students, the experimental group significantly outperformed the control group.



Figures 3. & 4. Two Years of Usage vs. No Usage - End of First Grade Scores by Ethnicity

Kindergarten Usage Compared to No Usage

The experimental group included students who used the adaptive curriculum during kindergarten only. The control group included students who did not use the adaptive curriculum. End of first grade scores were analyzed.

Group Differences Using Independent Samples *t*-tests

Independent samples *t*-tests examining group differences in end of year scores between the experimental group and the control group were conducted (see Figures 5 & 6).

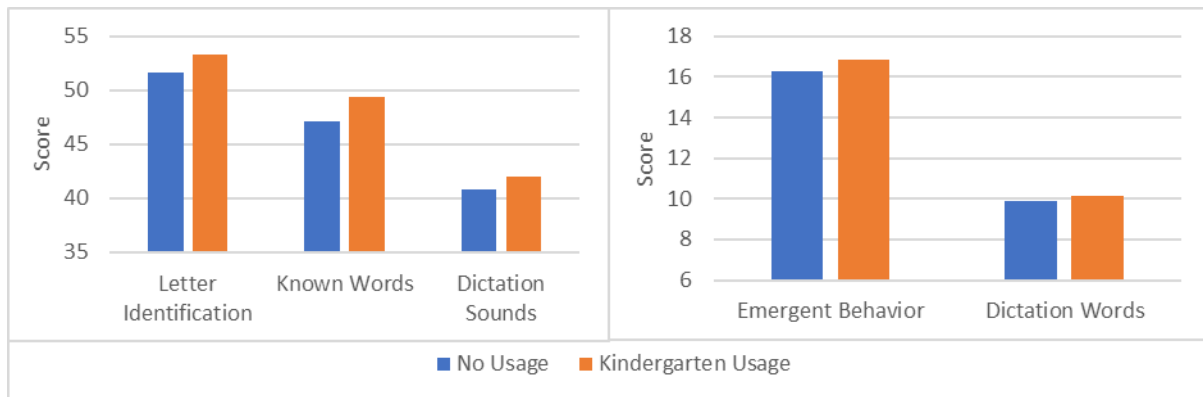
Letter Identification. Analysis of Letter Identification end of year scores revealed a significant difference between groups, $t(1, 1159) = -4.49, p < .01$, due to higher scores made by experimental students ($M = 53.25$) than by control students ($M = 51.60$). Effect size ($d = 0.26$).

Known Words. Analysis of Known Words end of year scores revealed a significant difference between groups, $t(1, 1151) = -2.25, p < .05$, due to higher scores made by experimental students ($M = 49.43$) than by control students ($M = 47.12$). Effect size ($d = 0.13$).

Emergent Behavior. Analysis of Emergent Behavior end of year scores revealed a significant difference between groups, $t(1, 1267) = -3.61, p < .01$, due to higher scores made by experimental students ($M = 16.85$) than by control students ($M = 16.28$). Effect size ($d = 0.21$).

Dictation Sounds. Analysis of Dictation Sounds end of year scores did not reveal a significant difference between groups, $t(1, 1164) = -1.38, p = .167$; however, scores were slightly higher for experimental students ($M = 41.95$) than for control students ($M = 40.85$).

Dictation Words. Analysis of Dictation Words end of year scores did not reveal a significant difference between groups, $t(1, 1142) = -0.85, p = .395$; however, scores were slightly higher for experimental students ($M = 10.13$) than for control students ($M = 9.92$).



Figures 5. & 6. Kindergarten Usage and No Usage - End of First Grade Scores by Substrand

Group Differences by Ethnicity Using ANOVAS

Two-way ANOVAs were conducted to examine the effects of the adaptive curriculum and ethnicity on each substrand of end of year scores (see Figures 7 & 8).

Letter Identification. There was no significant interaction between the effects of ethnicity and the adaptive curriculum on Letter Identification end of year scores, $F(6, 1275) = 1.81, p = .093$. Simple effects analysis showed that for Hispanic students, the experimental group significantly outperformed the control group. African American students in the experimental group scored slightly higher than students in the control group, but the difference was not significant.

Known Words. There was a significant interaction between the effects of ethnicity and the adaptive curriculum on Known Words end of year scores, $F(6, 1278) = 2.64, p < .05$. Simple effects analysis showed that for Hispanic students, the experimental group significantly outperformed the control group. African American students in the experimental group scored slightly higher than students in the control group, but the difference was not significant.

Emergent Behavior. There was no significant interaction between the effects of ethnicity and the adaptive curriculum on Emergent Behavior end of year scores, $F(6, 1274) = 1.65, p = .130$. Simple effects analysis showed that for Hispanic students, the experimental group significantly outperformed the control group. African American students in the experimental group scored slightly higher than students in the control group, but the differences were not significant.

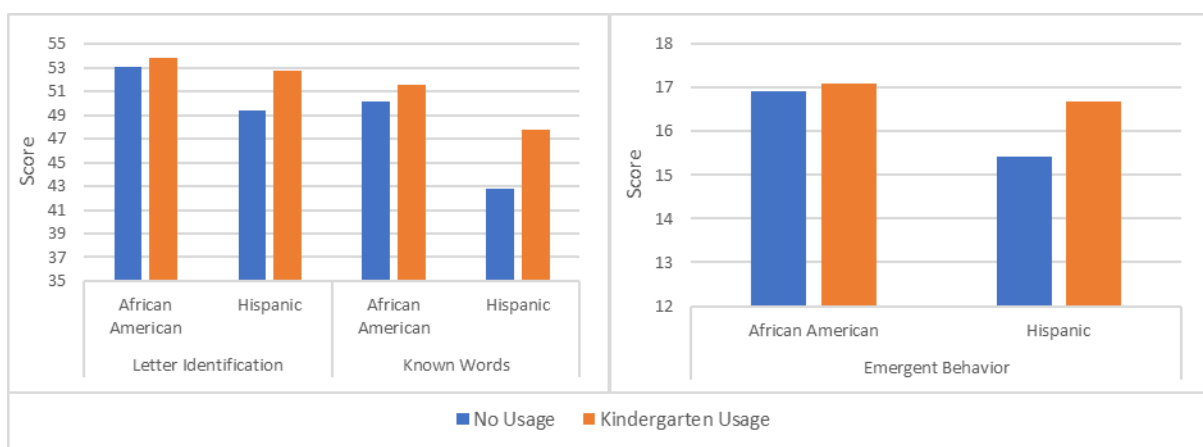


Figure 7. & 8. Kindergarten Usage and No Usage - End of First Grade Scores by Ethnicity

Conclusion

Because technology is so rapidly changing and being incorporated in today's everyday activities, more research is needed into the relationship between young children's engagement in learning and technology (Burnett, 2010). This study explores the impact of usage of CAI technology on literacy scores of elementary school students and expands on the need for more longitudinal research of the relationship between literacy and technology. In this study, long-term effects on literacy scores were investigated. Our hypothesis was upheld: Students who had usage of CAI for one year or two years outperformed students who did not use CAI. Students who used CAI for two years significantly outperformed students who did not use CAI on all five literacy strands. This indicates that more years of CAI usage lead to higher literacy scores. Moreover, students who used CAI during kindergarten and not during their first grade year outperformed students who did not use CAI in first grade end of year literacy scores, showing the long-term effects of CAI on early literacy skills.

Additionally, students of differing ethnicities in the experimental group also outperformed their control counterparts on literacy scores. Students who used CAI for two years outperformed students who did not use CAI on all literacy strands. Across literacy skills, students of various ethnicities who used CAI for at least one year outperformed their control counterparts – thus, CAI usage positively impacted early literacy academic skills in this study. This research contributes to the field by adding more longitudinal research to the lacking field of valid studies concerning technology in education.

Although the small effect sizes limit the implications that can be drawn from the study, the treatment effect was found across literacy strands and across ethnicities. This is an impressive finding, as most research into CAI in early childhood education finds effects that are not meaningful, or small effects that may disappear quickly after the CAI intervention is completed (Cheung & Slavin, 2011; Clements et al., 2011; Suggate, 2016).

Limitations include investigating literacy scores of students from one grade in one school district. The small sample size limits the conclusions that can be drawn. Future research would include longitudinal investigation of the impact of CAI on literacy scores across multiple districts. Additionally, more years of research would strongly contribute to the long-term impact of technology in education. Beginning CAI usage in pre-kindergarten and looking into the impact of that technology on the students' academic success through high school would be an extensive yet extremely important contribution to see if the increasing incorporation of educational technology in schools is beneficial to students.

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The importance of European Framework of Key Competences and New Skills Agenda for Lifelong Learning and Entrepreneurial Skills

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Abstract

In recent years, the identification of skills and competences is becoming more important and valuable, both in the area of educational program planning made by several organizations and the area of recognition of the individual's qualifications and employability. European Framework of Key Competences for Lifelong Learning established for the first time, in 2006, eight key competences that contemporary citizens need to have. Then, in 2016, the adoption of the New Skills Agenda for Lifelong Learning aims to improve both quality and comparability of skills and qualifications, as well as to improve information and knowledge on skills in order to provide better career choices to European citizen. It is particularly important to highlight the need for common commitment and cooperation to improve the relevance and quality of skills so that they are consistent with the changes to the needs of labour market but also to provide everyone with a common set of basic skills as well as entrepreneurial skills. Thus, this article presents the basic skills of the European Framework of Key Competences as well as the specific objectives of the new Skills Agenda in order to highlight new skills policies in lifelong learning and entrepreneurship.

Keywords: key competences, basic/new skills, lifelong learning, entrepreneurial skills

Main Conference Topic: Education, Teaching and Learning

Introduction

Lifelong Learning has become a necessity for all citizens. Individuals need to enhance their skills and competences throughout their lives, not only to further develop their personality and to be able to actively participate in the society in which they live, but also to be able to respond successfully to a changing world (Sipitanou, 2014a).

According to international studies, “competence” is defined as a combination of knowledge, skills and attitudes appropriate to a particular situation, while “basic competences” are those that support personal fulfillment, social inclusion, professional activity, and active citizenship for 21st-century citizens.

The knowledge, skills and competences of the European workforce are important factors in the productivity, innovation and competitiveness of the European Union. Increasing internationalization, the rapid pace of change, and the continual introduction of new

technologies means that European citizens not only need to improve the specific skills associated with their job, but also to have the general competences that will enable them to adapt to the various changes. Furthermore, people's competences play an important part in ensuring motivation and satisfaction in the workplace, thus influencing the quality of one's work.

The orientation of European Framework of Key Competences

Following on from the Lisbon Strategy in 2000 (The Lisbon Special European Council, 2000) the Barcelona European Council decisions in March 2002 (European Parliament, 2002) and the orientation of Education and Training 2010 Work Programme, the European Parliament and the Council, at the end of 2006, issued a Recommendation containing The European Framework on Key Competences for Lifelong Learning (European Parliament, 2006), identifying and defining for the first time at a European level (Sipitanou, 2014b), the 8 basic skills that modern European citizens need:

1. Communicating in a mother tongue

Communication in the mother tongue is defined as the ability to express and interpret concepts, thoughts, feelings, facts and opinions in both oral and written form (listening, speaking, reading and writing), as well as the ability to interact linguistically in an appropriate and creative way in the full range of social and cultural activities, such as in education and training, work, home and leisure.

2. Communicating in foreign languages

Communication in foreign languages, to a large extent, involves the basic skills of communication in the mother tongue as it is based on the ability to understand, express and interpret concepts, thoughts, feelings, facts and opinions in both oral and written form in an appropriate range of social and cultural contexts according to the wants and needs of the individual. Communicating in foreign languages also requires skills, such as mediation and intercultural understanding. An individual's level of proficiency varies between the four dimensions, listening, speaking, reading, and writing, and between the different languages, as well as being related to the individual's social and cultural background, environment, needs and interests.

3. Mathematical, scientific and technological competence

Mathematical competence is defined as the ability to develop and apply mathematical reasoning to solve a range of problems in everyday situations. In order to achieve a solid foundation in the functional knowledge of numeracy, the emphasis is placed on process and activity, as well as knowledge. Mathematical competence involves, to varying degrees, the ability and willingness to use mathematical modes of thinking and presentation.

On the other hand, competence in science refers to the ability and willingness to apply all the knowledge and methodology to explain the natural world, in order to identify questions and draw evidence-based conclusions. Competence in technology is deemed as the application of that knowledge and methodology in order to satisfy perceived human wants or needs. Competence in science and technology involves understanding the changes caused by human activity and responsibility as an individual citizen.

4. *Digital competence*

Digital competence involves the use of Information Society Technology (IST) for work, leisure, and communication with self-confidence and in a critical manner. It is supported by basic skills in ICT, such as the use of computers for the retrieval, assessment, storage, production, presentation and exchange of information, as well as for communication and participation in collaborative networks via the Internet.

5. *Learning to learn*

Learning to learn is the ability to pursue and persist in learning, to organize individual learning through effective management of time and information, both individually and collectively. This competence includes awareness of the individual's learning process and learning needs, identifying available opportunities, and the ability to overcome obstacles for successful learning. The methodology of learning requires learning to be based on past knowledge and life experiences, in order for one to use and apply knowledge and skills in a variety of contexts, such as at home, at work, in education and training. This competence means acquiring, processing and assimilating new knowledge and skills, as well as seeking and using appropriate guidance.

6. *Social and civic competences*

These include personal, interpersonal, intercultural, social and civic competences, and cover the entire range of behaviors that equip individuals to effectively and constructively participate in social and working life, and particularly in increasingly diverse societies, and to resolve conflict, where necessary.

More specifically, civic competence appropriately equips individuals to fully participate in daily life, based on knowledge of social and political concepts and structures, and the commitment to active and democratic participation.

7. *Sense of Initiative and entrepreneurship*

The sense of initiative and entrepreneurship refers to an individual's ability to turn ideas into action and includes creativity, innovation and risk-taking, as well as the ability to plan in order to achieve specific objectives. It supports people, not only in their everyday lives, both at home and in society, but also in the workplace, particularly in terms of being aware of the context of their work and seizing opportunities. It forms the foundation for the specific skills and knowledge needed by those who are active in or contribute to social or commercial activity.

It is worth mentioning that the reference to entrepreneurship is very important, especially at a time of new conditions in the labour market with increased levels of unemployment. It should also be noted that although the important role of education in economy is recognized by most of the literature, however, the factor of entrepreneurship education as a variable of the growth of the entrepreneurial activity of a country was recognized just a few years ago (Verheul & van der Kuip, 2002). The development of business education, initially in the U.S and then in Europe and other countries, is largely due to the recognition of its contribution to tackling unemployment. Thus, although the factor of general education plays an important role in increasing level of societies in general but even

in the development of a healthy and sustainable entrepreneurship, one of the most crucial variable for entrepreneurship flourishing is entrepreneurship education. The development of entrepreneurial spirit has often been reflected in various EU educational programs, while entrepreneurship courses have been introduced in many countries, within curricula (Kuratko, 2005).

8. *Cultural awareness and expression*

By cultural knowledge and expression is meant the appreciation of the importance of the creative expression of ideas, experiences and emotions in a range of media, including music, performing arts, literature and the visual arts.

All 8 competences are equally important, as each one contributes to the individual's success in the knowledge-based society.

The basic skills are well-defined and their content is specified in terms of key knowledge, key skills, and key behaviors/attitudes. Moreover, there is an overlap and interconnectedness between most of the competences, while there are seven transverse skills that are applied throughout the Reference Framework. These are:

- critical thinking,
- creativity,
- initiatives,
- problem-solving,
- risk assessment
- decision-making, and
- the constructive management of feelings, which play a role in all eight key competences.

It would be useful to mention that these skills are also entrepreneurial skills. Basic entrepreneurial skills are those skills that are necessary for an effective entrepreneurial behaviour at an individual and social level. Decision making, creative problem solving, strategic thinking, time management, sale, encouragement and negotiation are some of these entrepreneurial skills that should be taught (Gibb, 1998). These skills are supported by abilities that, according to references in the literature (Kourlisky, 1980; Rushing, 1990; Born & Altink, 1996), are the motivation to achieve, creativity, the need for autonomy, initiative, risk taking, seek opportunities, setting goals, self-awareness, persistence, self-confidence, self-esteem, intense willingness to work and flexibility.

From the above seven transverse skills and the reference to entrepreneurial skills, there is a clear and understandable relationship between them. Thus, at this point, it could be noticed that there is a connection between skills and labour market that aims to contribute to employment growth and development of entrepreneurial spirit of young people.

The importance of New Skills Agenda

In line with the Europe 2020 strategy, education and training systems need to be modernized so as to enhance their efficiency and quality and equip people with the skills and competences they need to succeed in the labor market. A significant contribution to achieving the objectives of the “Europe 2020” strategy is the Strategic Framework for European Cooperation in Education and Training, which comprises an important means of modernizing education and training (Official Journal of the EU, C 70/9 8.3.2012).

To this end, the European Commission has adopted in 2016 the New Skills Agenda for Europe (European Commission, 2016a), with the aim of improving the acquisition and recognition of skills, and promoting competitiveness and innovation, and ultimately increasing employability. In this way, the Agenda contributes to the Commission's number one political priority, which is a new impetus for employment, growth and investment.

The New Skills Agenda for Europe aims to make better use of the skills already available and to provide new skills that people need to find quality jobs and improve their life opportunities and focuses on the following 3 main axes:

1. Improvement of the quality and relevance of skill development

It is essential that formal education and training equip all learners with a wide range of skills that ensure personal fulfillment and development, social inclusion, active citizenship and employment. Early acquisition of these skills is the foundation for developing the higher and more complex skills required to promote creativity and innovation. These skills need to be reinforced through lifelong learning and give people the opportunity to evolve in rapidly developing workplaces and societies, as well as being able to cope with complexity and uncertainty (European Commission, 2016a).

To this end, the Commission proposes to the Member States to re-examine the 2006 Recommendation (European Parliament, 2006) regarding key competences in order to bring it into line with the economic and social changes that have occurred over the last ten years. This review will further strengthen an understanding of a common core of key competencies necessary for working and living in the 21st century, and whose introduction will be promoted in education and training programs, as well as national skills strategies. In addition, a better description, development, assessment, validation and comparison of key competences and relevant skills will be supported in a formal, non-formal and informal learning environment. Particular emphasis is put on business skills that enhance creativity, active action, innovation, and the seizing of opportunities by the individual, including the promotion of policies to ensure that all young people have acquired practical business experience before they finish school.

2. Improvement of the visibility and comparability of skills and qualifications

The identification and validation of skills are of particular importance for people with lower skill levels, the unemployed, those who need to change their career, and immigrants. It should also be noted that the differences between education and training systems in the European Union make it difficult for employers to assess the level of knowledge and skills of persons with qualifications from a country other than their own.

In fact, the Commission has put forward a proposal to revise the European Qualifications Framework (European Commission, 2016b) in an attempt to make it easier to understand the skills and competences of immigrants and to help them better integrate into the European Union's labor market. In this way, the forthcoming review of the European Qualifications Framework (EQF) will make it easier to compare qualifications in different countries and help learners, workers and employers to better understand what a job candidate knows and can do. The revised EQF will also facilitate comparison and understanding of the qualifications of third-country nationals.

3. Improvement of information and knowledge on skills in order to provide better career choices

With regard to improving information and skills awareness to provide better career choices, people should be able to access and understand the skills information available, irrespective of whether they are in the process of seeking work, or selecting a field of study or learning institution. They also need the appropriate means to be able to self-assess and successfully present their skills and qualifications. In addition, since bridging the gap between education, training and the labor market requires a fair amount of effort, employers and other organizations will also benefit from this procedure by having more efficient and effective ways of identifying and recruiting people with the appropriate skills and qualifications.

Finally, it is stressed that people ought to be able to use the full range of skills they possess both for their career and lifelong learning. It is, therefore, increasingly necessary for people to learn and to develop skills in various environments beyond the formal education and training system. This can include work experience, in-house training, digital resources and volunteering, which will, of course, be validated and certified (Official Journal of the EU, C 398/1 22.12.2012).

Conclusion

In conclusion, it is worth emphasizing that the New Skills Agenda provides common ground for the European Union, the Member States and stakeholders at all levels. Its aim is to find a common vision and a commitment to cooperation in order to, on the one hand, improve the relevance and quality of skills so as to keep pace with the rapidly changing needs of the labour market, and on the other, to provide all stakeholders with a common set of core skills. This has the result of also facilitating an understanding of professional qualifications, making the movement of workers and trainees within the European Union easier. It should be noted that the social partners will also play an important role in the successful development of this Agenda on the basis of initiatives at both a European and national level, as skills determine to large extent competitiveness and innovation capacity and they are factor of investment attraction and also a catalyst for job creation and a lever of growth. It is therefore clear from all the above that the future prosperity of Europe depends on the optimal development of its human capital.

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Development and Challenges of English Taught Programs in Asian Countries: Take Taiwan as an Example

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Abstract

For several reasons the use of English Taught Programs (ETPs) is burgeoning in many universities. We see such programs not only in European countries, but also in Asian ones. At the same time, research in the use of English as a Medium of Instruction (EMI) has also gained much momentum. However, the challenges faced by those engaged in such programs is not the same everywhere. In this study the use of ETPs in Asian countries is examined and a background of such programs is presented. The challenges faced by those engaged in such projects, including the managers, administrators and instructors as well as the students will also be discussed. The countries of Asia are many and diverse and most have very different histories. Unlike Singapore, Malaysia, and Indonesia, which all have a colonial history, countries like Korea, Japan and Taiwan do not have a second official language, other than their native tongue. Taiwan will be the focus of discussion in this paper as ETPs seem to be a future trend in the country. Suggestions are also provided for future improvement.

Keywords: English as the Medium of Instruction (EMI), challenges, Taiwan, Asia, English Taught Program (ETP)

Main Conference Topic: Global Issues in Education and Research, Education, Research and Globalization

Introduction: the ascent of English Taught Programs (ETPs)

The world is moving fast towards becoming a globalized village, and English seems to be the most common language medium utilized in communication, not only in business, but also in the academic world. A survey made in 2014 on the use of ETPs in European higher education showed the existence of 8089 ETPs in the European countries. This was a dramatic increase over the 725 programs that has been in use in 2001 (Wächter & Maiworm, 2014).

Unfortunately, there are yet little empirical research focusing on EMI instructors partly because EMI instructors are mostly not familiar with research methods in educational field. While they are already heavy-loaded by their double time spent in preparation for EMI courses and the research demand in their own fields, such as economics, finance, it is only natural that EMI instructors have no more time to spare to the research on the effectiveness of using English as an instructional language and the frustration an EMI teacher may have.

Despite some considerable controversy, such instruction models are being used in more universities than ever. Although surveys and statistics show that EMI and ETPs are a global phenomenon, the context varies from country to country. In this study a look has been taken at the ETPs in use in Taiwan and the challenges and problems faced by the program managers, teachers and students in the country.

ETP development in Asia and in Taiwan

All the Asian countries have developed various patterns for the cooperation needed for international education. Malaysia, for examples, sees itself as a regional educational hub and cultivates partnerships with Anglo universities to provide EMI programs. In Japan, the government initiated the “Global 30 Project for Establishing Core Universities for Globalization,” with the aim of attracting 300,000 overseas students to Japan by the year 2020. ETPs in Japan are also regarded as alternative sources to compensate for the declining rate of university enrolment. In Hong Kong, six out of the eight government-funded universities are English medium universities. As an answer to parental demand, more secondary schools now also provide classes in English to prepare students for future EMI environments. In Korea, universities have been encouraging lecturers to offer EMI courses since the 1990s. This policy was responsible for considerable increases in the number of international students which was 78,000 in 2012 (Hou et al., 2013, cited in Tsou & Kao, 2017). In the same vein, the Taiwan government launched two major national projects to urge local campuses to open up to international students, expecting to attract 120,000 foreign students by 2020 (Ibid).

In 2003, about 4,697 courses were being taught in English in Taiwan (Lo, 2010) however, this number had increased rather dramatically to 24,077 by 2014 (Tsou & Kao, 2017). There were 19 ETPs in 2006 offering Bachelor’s degrees, but by 2017, the number had increased to 39 (CADC, 2018). To start with ETPs were mostly provided at the Master’s and Doctoral levels (MA and PhD) but in recent years there has been a steady increase of ETPs at Bachelor’s (BA) level. In 2014 the Taiwan government began to officially encourage the establishment of ETPs and EMI courses by the provision of financial support. Thirty-six ETPs from 16 universities have been given financial aid (Ke, 2015).

ETPs have been established all around the world for various reasons. The earliest attempt to establish ETPs in European countries was to “increase the international mobility of students” (Ibid, p 25). In addition, other shared goals were to facilitate understanding between different countries and to provide equal opportunities for young researchers in the lower and middle income countries¹. The use of ETPs to build the English language capacity of a country and prepare their students for the fierce competition in a world market are also important considerations for policy makers (Dearden, 2014). Universities also provide ETPs to gain international recognition of local education (in Kazakhstan for example)².

Although income from tuition has also been mentioned as an objective, this is not the most important. In fact, most European institutions try to “remove or reduce the barriers that can hinder the international mobility of their students” by the use of scholarship schemes, (Ibid, p 25). Through ETPs, universities can also produce more research papers in English, which helps raise their ranking in the international education market. It is interesting to note that teachers in ETPs focus on completely different goals. EMI teachers usually see themselves as “improving communication, exchanging ideas and creating relationships between countries, or even facilitating world peace” (Ibid, p 16).

¹ Students can pay relatively less to receive an all-English education and avoid having to travel to an English-speaking country and the necessary financial implications.

² Or, “to be in line with established world standards of teaching and assessment” (Dearden, 2014, p 15).

The increase of ETPs probably has much to do with the development of new type of market-oriented universities. While educational institutes search for more student fees to survive, it is not difficult to find that international education could be lucrative and attract tuition-paying students. Knight (2008) considers political, economic, academic and cultural reasons as the most important ones for the development of international education by universities, Kirkpatrick (2011) suggests that “for the providers, the benefits are overwhelmingly financial” (p 6).

In Taiwan, there are some ETPs that are aimed at attracting local students as well as international ones. Programs focusing on different targets will reflect different problems. One of the major objectives of ETPs in Taiwan is compensation for the poor enrollment rate by local students at the universities caused by the competitiveness of the global educational market. Many local students opt for tertiary educational opportunities abroad. In 2010, only 556 high school graduates went to study abroad, but by 2015, this number had increased to 1443 (Lin, 2017). Countries like China and Germany make it easy for Taiwanese students to apply and it is expected that many more students will study abroad this year. In Taiwan, the private universities have been the most affected by the decrease in college enrollment and this may explain why the private institutes include ETPs as important for their sustainability³.

The debate on EMI and ETPs is sometimes heated in Taiwan, particularly when university administrators make it a rule that newly recruited professors should provide EMI courses. The ability to teach in English is also one of the priorities when administrators are interviewing new candidates. The debate will last for several days, questioning the connection between EMI and internalization, and then become quiet once the heat is gone. The establishment of English as a second official language in Taiwan as a government policy has also been proposed several times. However, the proposal has never moved very far because of doubts and suspicion about the possible impact on national solidarity. Similar debates have taken place in Korea, where some universities have implemented an English-only policy and public controversy reins over the students’ right to learn in their first language (Kym, 2014).

As changes of language policy will usually incur opposition, the debate on Taiwan’s ETPs also focus on the opposition from instructors who are partially forced to change their instructional language. One experienced EMI professor Xin-tien Liao also reminded that the administrators should understand that it is not easy, sometimes painful, for a teacher to switch his/her language of instruction. The policy maker should be more sympathetic to the emotional aspect of EMI teachers (2016).

Challenges facing EMI programs

EMI programs are controversial and divisive in nature. They are controversial because of the debate on nationality (being unpatriotic), educational efficiency (learning contents in L2) and language acquisition (better learning results via L1). They are divisive because of their relative high tuition fee in local market and thus might exclude the lower social-economic groups from having access to the educational opportunity⁴. Kirkpatrick

³ In Taiwan, students will take government-run universities as their first priorities. If their test grades are not good enough to enter national universities, they will then enroll in private colleges.

⁴ The best government-run university, National Taiwan University, is about to set up an ETP, recruiting 120 international students and 40 local students, with the tuition fee of USD 20,000 per year, approximately 6 times that of the non-English-taught programs.

doubts that the internationalization attempt of recent corporate- and market-oriented universities may result in Englishization and thus further strengthens the UK-US “primacy in the realm of higher education” to promote Anglo-Saxon values and to jeopardize home cultures (UK/US Study Group, 2009: 21, cited in Kirkpatrick, 2011, p. 11; Dearden, 2014; Toh, 2016). It is such concern of Englishization that EMI is rejected because of political reasons, such as to protect national identity and the freedom to use a home language in learning. In the past, for example, in Israel, EMI or CLIL courses in English will attract hostile media coverage. In Indonesia, EMI programs were ordered by the court to stop because of the fear that Bahasa Indonesia may be associated with the poor while English will be associated with the elite class (Dearden, 2014).

Unlike the many other aspects of teaching, ETPs are usually in a state of flux. They are the result of government promotion, dropping birth rates and economic changes. In Dearden’s survey, nearly 62% of respondents reported EMI policy changes in their countries (2014). When governments stop subsidizing ETP their future becomes uncertain, and this uncertainty is exactly what causes the problems, which have three aspects: administration, instructors and students.

Administrators and managers

Normally, one would expect reasonable proficiency in English to be a default requirement for enrollment in an ETP program. However, complaints by instructors include some about students lack of confidence in the use of English, despite their having passed the language requirement for entering the program. For example, for enrollment at ETPs at the University of Málaga in Spain, university regulations, according to the Common European Framework for Reference (CEF), state B1 English level proficiency to be a recommendation but not a requirement, (Barrios et al., 2016). In Japan, Toh (2016) also noticed that universities admit students with less than satisfactory levels of English proficiency because of a desperate need for international students.

ETP administrators are also frequently confronted with problems of the level of English proficiency of the teachers themselves. Many local teachers may over-estimate their abilities to teach content in English. A common myth is that anyone who can speak English, can also teach English. It is an astounding fact that 20% of the local school teachers in Turkey only have a CEFR (Common European Framework of Reference) A2 English language level (Dearden, 2014). In Taiwan, local teachers recruited to teach EMI courses, are not required to have language proficiency certificates. Usually the recruiting committee tests a candidates’ English proficiency during interviews. However, some of the senior local teachers, previously assigned to teach EMI courses, are not fluent in English. Some of these are still teaching because there is a serious shortage of competent EMI teachers. This is one of the reasons for poor student performance. Teachers are much better at teaching in their own native language and students will always learn better as well (UNESCO, 2008; Dearden, 2014).

So what is the purpose of ETPs in a university? The university needs to have clear goals for administrators, instructors, and students to follow. Toh even criticizes EMI as a facile and superficial way an educational institution advertises its difference and superiority to traditional L1 education. If the ETP administrators do not strengthen their competence and the management of their ETP projects, they will face a “gradual but certain demise” (Toh, 2016, p 2). A delicate approach to the inherent resistance to innovation inside institutes should also be taken to ensure the least traumatic experiences for those personnel involved (Ibid.).

For instructors

In Dearden's preliminary study, she found that most teachers actually have very limited experience and understanding of EMI teaching. My own initial experience was that the administrators do not even explain the background of the students and the educational goals of the ETP programs. I thought I would simply need to teach in English and present all my materials in English. I was frustrated to find a room full of bored and confused students who did not understand me or the jokes I told. The first semester was a disaster for both instructor and students, both hoping not to see each other again. That is exactly what many EMI teachers will do. The moment they have the opportunity to say no, they will get themselves out of the Herculean task.

While universities reap the financial benefits from fee-paying students, the EMI teachers struggle with the quality of their international classroom. The first question to ask is "can local knowledge be completely conveyed through a language that is not their native tongue?" Kirkpatrick (2011) finds that the essence of local knowledge will be altered through translation, citing traditional Chinese medicine as an example. He warns that "translation may radically alter the knowledge translated" (Ibid, p 12) and cited the unsatisfactory translations of the fundamental concept of *qi* in Chinese medicine.

For those who are not involved in EMI teaching, such as administrators, they may think that EMI is simply a matter of "translating course material and slides from L1 to L2" (Ibid, p 23). However, EMI teachers need to do more than simply adjust their teaching: They need to know how to modify their input, assure comprehension via student-initiated interactional modifications and create an atmosphere where students operating in an L2 are not afraid to speak (Dearden, 2014, p 23).

EMI teachers working in a multilingual and multicultural learning environment may also face communications problems as well as intercultural and didactic challenges. They are constantly having to mobilize the EMI triangle: the interplay between language, pluriversity and local lingua-cultural context⁵. Teachers, even with second language proficiency, will find that they face challenges because of cultural differences. Jae Woong Youn, assistant professor from Woosong University, South Korea, shared his experience in a multi-cultural classroom. A man stood up and shouted at a girl, telling her to shut her mouth. The instructor later found that the man and woman had the same Muslim background. In Muslim culture, women are not supposed to talk loudly in public. The male student thought he was doing the instructor a favor asking the girl to behave. From such experiences, it becomes clear that EMI teachers not only need language proficiency, but also have to be aware of the diverse cultural backgrounds of the students. In other words, EMI teachers need to be more culturally intelligent than others. Research shows that if teachers do not have multi-cultural background, they are prone to repeat their own cultural experiences in the international classroom (cited in Wang, 2007).

It is hard for EMI teachers to remain neutral and not show bias in an international classroom. In the US, teachers tend to assign individual tasks to Anglo-Saxon students, but with African-American students, they tend to assign group tasks. Sometimes teachers will interact more frequently with middle- and upper-class students. These same students are more likely to be favored by the teachers. Research also finds that teachers usually expect middle- and upper-class students to be better behaved, and to have fewer morality issues (Wang,

⁵ Course descriptions of the EMI workshops provided by University of Freiburg in Germany.

2007). Similar bias and prejudice might also exist in teachers facing an assortment of students from different countries. Most EMI teacher training programs are designed to strengthen the presentation and interaction skills of the teacher in the classroom. However, we do not see many courses addressing the issue of prejudice, assuming that it would not be a problem. Unfortunately, this is not the case and teachers are not neutral, they need to learn how to deal with related issues.

For students

Many EMI students, particularly Asians, enter EMI programs with the main objective of improving their own English proficiency. They are not prepared for the intellectual adjustments that they need to make. Asian students are used to learning passively and assume they can just sit and enjoy one-direction lectures without making any personal effort. Some are reluctant to adapt themselves to the new interactive teaching methods and make it quite clear that they prefer their own traditional way of learning. This causes problems not only for the student, but also for the teacher because interaction will fail without student participation.

Most EMI research focuses on student receptivity to EMI instruction. Many worry that the knowledge gained by the students from such instruction will be compromised by the language incompetence of local instructors and the students themselves (Han & Singh, 2014). The response to most surveys on student satisfaction with EMI courses, has been positive and the students believe that their English proficiency will be improved (Lo, 2010). However, the results of research into an increase in English proficiency and build up of professional knowledge are inconsistent. Some show that ETPs help improve student English proficiency, while others claim the opposite. The limited resources for the provision of the necessary ETP teacher support and the lack of experience in the process show too many variables in the outcome for a definite conclusion to be reached.

Suggestions

A solid EMI program will not prosper without a clear language policy at administrative level. Program managers and instructors need to be able to propose constructive goals and projects based on these policies. However, current surveys carried out in Asian countries that are developing EMI programs show that such policies are non-existent, or simply have not been clarified or made public (Dearden, 2014). This is probably why the arrangement of some ETPs has been rather inappropriate. In Taiwan, some courses are taught in English simply because instructors with the corresponding language ability were available. Sometimes, liberal arts such as Chinese⁶ have actually been taught in English. There has been very little planning behind this random arrangement of EMI courses.

Dearden's survey showed "little or no EMI content in initial teacher education (teacher preparation) programs and continuing professional development (in-service) courses" (p 2). Studies have also shown that students and instructors, as well as administrators should be prepared for the EMI program they are about to launch (Ibid, Toh, 2016). Courses and workshops should be organized for both students and teachers. EMI instructors, as well as their students, need to know their role expectations and impact.

In addition to professional knowledge, EMI teachers in a multicultural classroom should be culturally literate. The checklist designed for counselors or social workers dealing with students from different backgrounds can be adapted for use. EMI teachers need to have a

⁶ Two semesters of Chinese are a requirement at most universities in Taiwan.

knowledge and understanding of various cultures and really need to know the definitions of “culture,” “ethnic,” “mainstream,” “prejudice,” “ethnocentric,” “cross-culture,” (Wang 2007, p 162). Cross-cultural literacy also means having the ability to deal with cultural differences among students. Teachers need to be able to analyze and criticize cultures. Self-reflection on culture is also crucial. Last but not least, teachers should always be able to learn from various cultures (Ibid.).

It can be seen from the workshops and courses held for EMI instructors and students, that most emphasis has been placed on enhancing the English language and communication skills of the teachers. This seems to imply that one of the main educational goals in EMI classrooms is communication. Communication involves interaction. As a result, an EMI classroom should not be a lecture-only venue. A project-based learning approach may be a good choice for such an international classroom. In terms of practical classroom management, the use of an easy vocabulary and simple sentence structure is preferable for the conveyance of professional knowledge. The teacher should design the EMI classroom activities and discussions very carefully and peer evaluation should be introduced (Ke, 2015).

Conclusion

It is interesting to note that the ideas behind EMI and ETPs are still rather vague and unstable and have been developed within the confines of finance and a rapidly changing future. The subtitle of Glenn Toh’s book on EMI in Japanese higher education perfectly reflects the problems in ETPs — “presumption, mirage or bluff”. Toh even argued that the implementation of EMI in institutes in Japan, where Japanese had long been the only medium of instruction, will be “an extremely difficult, if not unsustainable, undertaking” (2016, p 2).

However, many educational institutes feel positive about English Taught Programs, educational managers and administrators should realize that “English-taught degree programs require a language plan of their own, which will be complementary to the larger university policy and plan... to ensure a smooth and collaborative transition into the English medium” (Marsh et al., 2013, p15).

Before administrators think of the financial benefits of ETPs, it is imperative for them to come up with multilingual language policies, so that ETP development does not simply become a celebration of Anglo-Saxon paradigm and control over international education. Consideration should also be given to the side effect of omnipresent English speaking when the ETPs are being developed with the aim of the promotion of globalization. Maybe Patricia Ryan, an English teacher who worked in Dubai for 30 years, was right when she called attention to language loss in her paradoxical Ted talk – Don’t insist on English.

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Brief biographies of the authors

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Dr. Jia-chen Chuo is assistant professor of English Taught Program in International Business at Shih Chien University, Taiwan. She received her Ph.D. in Translation Studies from National Taiwan Normal University. Her major research interests are women translators, translation ethics and Chinese translation history and theory. Her Ph.D. dissertation is a research of Chinese women translators from ancient times to the early twentieth century. She is currently interested in ethical issues in a globalized translation era, such as translator decision reflection, translator-cum-activists and translator ethics. Recently, she also extends her interests to language management and language policies in multinational corporations (MNCs).

Teaching Engineering Dynamics and Vibrations Using Emerging Technologies in Undergraduate Engineering Course

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Abstract

Emerging technologies have revolutionized the way engineering educators are leveraging digital power to design courses. In this report, we present the design of an undergraduate engineering course module on engineering dynamics and vibrations consisting of a virtual and remote laboratory. The module design followed the taxonomy from the Mobile Learning framework to leverage technological innovations for deep learning. The virtual laboratory consisted of apps that can be accessed on any SMART device such as phones or tablets. The apps allow students to manipulate various parameters to examine the effects of an earthquake on any structure. The virtual lab component was designed to build profound theoretical foundations of the topics in frequency response and resonance. Further, the power of digital technologies was employed to provide students' control of their learning environment in form of remote laboratory. The remote laboratory is where students were able to control physical apparatus to conduct experiments from a different location via the Internet. We assessed students' performance based on a knowledge test (ECSET) and a self-efficacy self-report (ECAT), at a Midwestern university in the United States of America. The analysis report provides evidence of the instructional effectiveness of this technologically enhanced course module combining virtual and remote laboratory environment.

Keywords: remote laboratory, virtual laboratory, SMAR Model, Learner's control

Main Conference Topic: Emerging Technologies

Introduction

Engineering education requires students to be proficient both in theory as well practice. Typically, the theory aspect is covered in lecture-based classroom teaching and the practice is provided in a physical laboratory. This description may seem adequate to prepare engineering students to deliver their best in the work environment. However, research literature consists of reports that discuss the inadequacies of this approach (Felder, Woods, Stice, & Rugarcia, 2000). Many reports show gap in students' learning with the lecture method. Moreover, the physical and financial limitation of the universities in maintaining the laboratories is a prevalent issue associated with engineering education (Sastry, Rao, Rao, Clee, & Kumari, 2016).

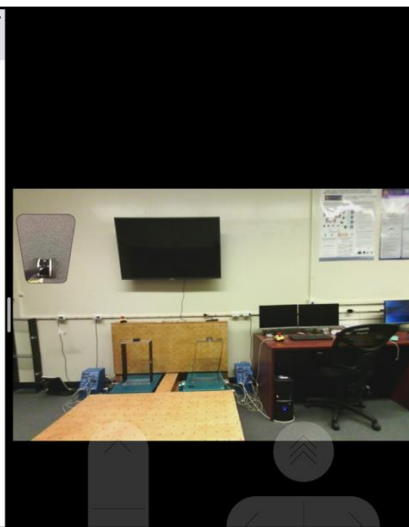
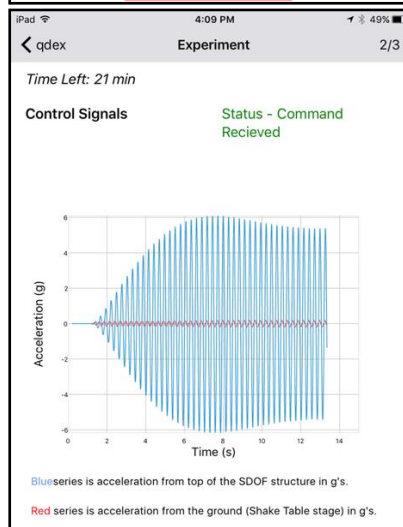
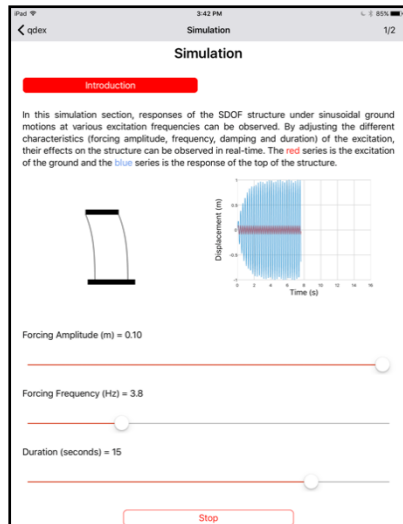
Many innovative solutions have been proposed to improve engineering students learning outcomes. Among these solutions, the most dominant is the use of virtual laboratory.

A virtual laboratory is built leveraging the power of the digital technologies to simulate physical lab environment. A virtual laboratory comes with many advantages such as financially less expensive compare to the physical lab, high level of students' interactivity while conducting the experiments, ability to run the experiments multiple times by altering the parameters to note the changes in the outcomes (De Jong, Linn, & Zacharia, 2013; Guerrero, Pizano, & Thomson, 2018). However, the virtual laboratories are criticized for providing oversimplified version of the phenomenon where environmental details are eliminated. This approach may lead students leaving with insufficient training to handle real-life engineering scenarios. (Balamuralithara & Woods, 2009; Ertugrul, 1998).

More recently, the enhanced learning outcomes of using virtual laboratory in combination with the physical laboratory has also shown positive results (De Jong, Linn, & Zacharia, 2013). According to the authors, the lab modality is geared towards a specific learning benefit. The virtual labs support conceptual learning and physical labs on the other hand promotes procedural learning benefits. A combination approach including physical and virtual lab is therefore proposed as a better alternative to limiting the practice training with virtual labs. However, this still doesn't mitigate the issues associated with the sustaining of a physical lab. Issues such as procuring and maintaining expensive equipment to accommodate all students' need and to allow them enough practice time, and multiple times (Guerrero, Pizano, & Thomson, 2018).

Another, relatively recent approach to address issues attached with the maintenance of the physical lab is to design a remote lab (García-Guzmán, Villa-López, Vélez-Enríquez, García-Mathey, & Ramírez-Ramírez, 2017). The remote laboratory offers the advantage of allowing students to conduct experiments from anywhere over the Internet without simplifying any environment factors unlike in the virtual lab. Although, students are able to control the lab using software, they are able to manipulate the real-physical equipment in the laboratory remotely.

In this report, we present a study that attempted to take advantage of the student-centered features of both virtual and remote laboratory. The virtual laboratory consists of shake-table simulation that the learners can explore by manipulating parameters to see the effects of the changes in real time. The remote laboratory provides learners' control of the equipment to conduct experiments from any physical location via the Internet. See Figure 1.



(a) Virtual Laboratory

(b) Remote Laboratory

Mobile Learning Framework

In applying the educational lens, we employed the substitution, augmentation, modification, and redefinition (SMAR) model developed by Ruben Puentedura (Romrell, Kidder, & Wood, 2014) because we wanted to be certain that creating virtual labs provided learners with opportunity to learn the concept in most interactive and collaborative space. According to this model, substitution and augmentation are the lowest form of technology integration for learning where pen and paper tasks are completed using digital technologies. The modification and redefinition stage are really where the digital technologies benefits and support students learning. The shake table mobile simulation provided students opportunity to explore the concept of frequency response and resonance phenomenon by manipulating parameters such as forcing amplitude, forcing frequency, excitation duration and structural damping to see their effects on one story structure. Through this exercise, students can observe the behaviors of the structure when the excitation frequency is smaller than, equal to and larger than the natural frequency, as well as the effect of resonance. To help students test the knowledge, quiz questions are embedded in the virtual lab. Hints will be provided when the answer is incorrect to guide students toward the correct solution. When all the questions are answered correctly, the slider to adjust the damping ratio is unlocked as a bonus for students to test its effect on the behavior of the structure. The virtual lab allows students to simulate the experiment to deepen their knowledge and explore new ideas without worrying about damaging the expensive equipment.

Learner's Control in Conducting Experiments via Remote Laboratory

Learner's control and autonomy are considered integral in the learning process to ensure deeper learning (Dickinson, 1995). The underlying psychological principle behind providing learner's autonomy is that it promotes intrinsic motivation to explore the learning content. In the remote laboratory, students control the shake table remotely to see the outcome.

To complement the virtual lab, a remote shake table laboratory (mRSTLab) has been developed by harnessing the power of mobile technology and Internet of Things (IoT). This mRSTLab allows students to remotely participate and conduct physical shake table experiments in real-time through smart mobile devices (e.g. smartphones and tablets). Through the mRSTLab, students will be given the opportunity to test a real one-story structure on a shake table. They can move the shake table at desired frequencies and verify structural responses observed from the virtual lab. Besides the sinusoidal excitations, the students will be asked to send in a sine sweep (sine waves with continuously varying frequencies) signal to excite the structure. The sensor measurements from the mass of the structure and the top stage of the shake table will be streamed back to the mobile device. Students can choose to send the measured data to a specified email address for post-processing or perform the analysis directly on the mobile device. With the data, students can follow the instructions to perform frequency response analyses on the input (sensor measurement from the top stage) and output (sensor measurement from the mass of the structure) of the system to obtain experimentally the structure's natural frequency and its transfer function by curve fitting the data. The natural frequency and transfer function from the experimental testing will then be compared to those obtained numerically. Explanations are expected, in the final report, on the differences that might be observed between the results from the numerical analysis and the experimental testing. The observations from the virtual lab are also compared to those from the actual experiments to better visualize the difference between simulations and real-world experiments.

In this report, we investigate the combined effects of a virtual and remote laboratory on students learning outcomes of frequency response and resonance concepts. Therefore, we raised the following research questions.

Research Questions: -

Q1. Did students' self-efficacy improved after completing the shake-table module?

Q2. Did students' knowledge improved after completing the shake-table module?

Methods

In this implementation to study the specific impact of the shake table simulation apps and mRST lab, module was divided into two submodules. We refer to them as P1 and P2.

Participants

The participants were students of a junior level required course for all Architectural Engineering (AE) and Civil Engineering (CE) in a Midwestern university during Fall 2017. There was a total of 72 students enrolled in this course. The students were informed about the implementation of the research module and were asked to sign the consigned form to use their data for the purpose of publication.

Instruments

To assess impact of the mobile learning module on student learning outcomes, two measures *Engineering Concepts Achievement Test* (ECAT), and *Engineering Concepts Self-Efficacy Test* (ECSET), were developed along with questions related to students' characteristics. Data obtained from both pre- and post-survey are analyzed using the Statistical Package for the Social Sciences (SPSS) and analyzed using paired sample Student's T-test for pre-posttest scores. The ECAT is a five questions long four-point scale (1

don't understand the statement, I understand the statement but don't know the answer, the statement is true, and the statement is false) knowledge test that will assess student learning of the frequency response and resonance concepts. The ECSET consists of questions adopted from a pre-validated instrument, which assess students' self-efficacy on the critical engineering concepts using a five-point Likert-type scale from strongly agree (1) to strongly disagree (5).

Dependent variables

Engineering Concepts Self-Efficacy Test (ECSET) – The psychological factor that we intend to investigate in this intervention is self-efficacy. The self-efficacy as defined by Bandura (1977) is the ability of students to feel confident in their ability to perform a task. The research literature consists of reports which suggest that often students either do not pursue engineering major or drop out because they do not think they will be successful in completing the course. We hypothesized that students in this course, because of the interactive materials in form of virtual and remote lab will develop the confidence in themselves about their ability to successfully complete the course.

Engineering Concepts Achievement Test (ECAT) – The primary focus of this Lab module is to make students proficient in the frequency response and resonance concepts. We believe that these concepts are foundational and basic to understanding many other advanced concepts that civil and architectural engineering students needs to use regularly.

Results and Findings

Descriptive

In the P1 submodule implementation, the total number of students were 75. There were 51 males, 23 females, and others chose not to answer. A majority of students were Caucasian (47) and other students identified themselves as either two more races (6), Asians (5), African American (3), or American Indians (2). There were 4 students who reported their races to be "other". Most of the students (46) were in the third year and other 24 students were in the fourth year. The remaining 5 students reported their academic status as "other". All but three students reported to have used their smart devices for entertainment, information access, and learning activities.

During the P2 submodule implementation, a total of 67 students participated in the study. There were 47 males and 20 females. Most of the students were Caucasian (57). The other races include American Indians (2), Asian (4), African Americans (2). There were 10 students who reported from being two or more races or others. Most of the students (40) were in the third-year college. Other were a significant number (24) of students in their fourth level. There were 4 students who reported their academic status as others. All the students reported to have used their smart devices for entertainment, information access, and learning activities.

Research Question 1 & 2

The analysis of data suggests that students self-efficacy and knowledge improved after the interacting with the technology enhanced module consisting of virtual and remote lab. The results of the Student's Ttest comparing the pre-posttest results are discussed below supporting the above outcome.

Delineated in Table 1 are the pre-posttest comparison for both P1 and P2 implementation of the mobile apps and mRSTLab. The items included in the tables are those where there was a statistical difference between pre-posttest scores.

The results of the implementation suggest positive impact of using Apps and mRST. There was statistically significant difference on many ECSET items for P1 and almost all the

ECSET items for P2. There were two ECAT items on which students performed better on the posttest than on the pretest.

Table 1: - ECAT and ECSET Pre/Posttest Scores for Fall 2017 Semester

Measures	Mean Pre/Post	T-test	p value
Total ECAT			
P1 - ECAT Item 2	0.44/0.65	3.19	0.002
P1 - ECAT Item 3	0.35/0.53	2.50	0.015

Measures	Mean Pre/Post	T-test	p value
Total ECAT			
P2 - ECAT Item 2	.43/.61	-2.099	0.040
P2 - ECAT Item 5	.49/.67	-3.287	0.002

Measures	Mean Pre/Post	T-test	p-value
P1 – ECSET - Frequency Response Item 2	2.44/2.26	1.746	0.86
P1 – ECSET - Frequency Response Item 4	2.27/2.11	1.862	0.67
P1 – ECSET - Frequency Response Item 6	2.95/3.29	-2.692	0.009
P1 – ECSET - Damping Resonance Item 2	2.53/2.32	2.732	0.008
P1 – ECSET - Damping Resonance Item 3	2.84/2.61	2.029	0.047
P1 – ECSET - Damping Resonance Item 6	2.89/3.31	-3.608	0.001

Measures	Mean Pre/Post	T-test	p value
P2 – ECSET - Frequency Response Item 1	1.85/1.64	2.867	0.006
P2 – ECSET - Frequency Response Item 2	2.31/1.87	4.968	0.000
P2 – ECSET - Frequency Response Item 3	2.66/2.02	5.579	0.000
P2 – ECSET - Frequency Response Item 4	2.16/1.93	2.229	0.030
P2 – ECSET - Frequency Response Item 5	2.16/1.85	3.494	0.001
P2 – ECSET - Frequency Response Item 6	3.21/3.59	-2.889	0.005
P2 – ECSET - Damping Resonance Item 1	1.98/1.66	3.537	0.001
P2 – ECSET - Damping Resonance Item 2	2.33/1.98	3.817	0.000
P2 – ECSET - Damping Resonance Item 3	2.67/2.10	5.564	0.000
P2 – ECSET - Damping Resonance Item 4	2.25/1.92	4.284	0.000
P2 – ECSET - Damping Resonance Item 5	2.20/1.93	2.454	0.017
P2 – ECSET - Damping Resonance Item 6	3.20/3.54	3.223	0.007

Discussions and Conclusions

The mobile Apps and the remote lab module in the junior level required course for all Architectural Engineering (AE) and Civil Engineering students suggest positive learning outcomes and enhanced levels of confidence in their ability to learn and explore the content on Engineering Dynamics and Vibrations. Mostly in both the components, P1 & P2 ECSET items such as I am confident I can do well on exams, I can understand topics that build on the knowledge of Engineering Dynamics and Vibrations or I am confident that I know a lot of the Engineering Dynamics and Vibrations topic suggest that the lab component elevated their perception of preparedness and understanding of this topic. The component of self-efficacy is an important psychological factor that determines students achievement (Bandura, 1977). We believe that a meaningful technological integration in form of Mobile apps simulation and remote lab where students are given significant autonomy of their learning conditions resulted into they becoming responsible and taking charge of their own learning. Further, this

may have led to prolonged engagement with the learning materials and consequently deeper understanding of the concept.

Therefore, we believe a combination of virtual and remote lab design provides a learning environment which allows to take complete charge and responsibility of their learning and thereby results into enhanced learning achievements. The research literature consists of reports on a variety of innovative solutions to address issues associated with preparing engineering students both in theory and practice. This solution includes building a virtual lab simulating the physical lab environment or combining the virtual lab instruction with the physical lab experimentation-based instruction. This study contributed by investigating the instructional effectiveness of harnessing the power of digital technologies to offer both virtual labs and remote access of physical lab in learning frequency response and resonance concepts. The results are promising and suggests students to in fact benefit from this combination of interactive learning environment to provide theory as practical training. More research is warranted at different universities as well as civil and architectural engineering courses to further generalize the results of this study.

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Zhaoshuo Jiang is an assistant professor in Civil Engineering at San Francisco State University. His current research interests mainly focus on Smart Structures Technology, Structural Control and Health Monitoring and Innovative Engineering Education. To maximize student learning, he is committed to creating a nurturing learning environment for engineering students and has been working on virtual laboratories since he attended graduate school in 2006.

Author 3

Alec Maxwell is currently a graduate student in the School of Engineering at San Francisco State University. Besides actively conducting research on innovative tools for engineering education, he also serves the community as the President of the American Society of Civil Engineers for the San Francisco State University chapter.

Connecting Intensive English Program Students to Campus and Community through a Common Reader Program

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Abstract

The purpose of this study was to examine the effects that participation in a university's campus common reading program had on the language abilities and feelings of connection to the campus and community by students who read the book as part of an Intensive English Program reading/writing course. The results showed that while students clearly benefited from activities *inside* the class by assisting them in better understanding both the English language and American culture, they were clearly not reaping the benefits of the program *outside* of class and that more efforts to encourage participation in events that would create greater campus and community connection are warranted.

Keywords: Intensive English Programs, Isolation, Common Reader Programs, Connection to Campus and Community

Main Conference Topic: Higher Education, Language Education

Introduction

Since the mid-20th century, the number of international students attending colleges and universities in the United States has grown exponentially, with over one million foreign students matriculating during the 2016-17 school year. Commensurate with this growth has been the rise in Intensive English Programs (IEPs) at U.S. colleges. IEPs, according to *Open Doors 2017*, the publication of the Institute of International Education (2018), "are full-time educational *programs* that typically provide 15 or more hours of class instruction each week. Their intention is to teach international students to speak, write and understand English up to the level required for successful academic performance at a U.S. college or university."

According to Di Maria (2016), IEPs "serve to provide access to U.S. higher education for academically qualified students who require assistance in improving their level of English language proficiency in order to achieve specific academic objectives." The professionals who work in such institutions, he continues, "can assist with the development of training programs and resources for university faculty and staff charged with serving an increasingly diverse student body." There are currently at least 627 such programs, both for-profit and not-for-profit, spread across the United States, with 108,433 students studying in Intensive English Programs during the 2016-17 school year, according to *Open Doors*.

One such intensive English program, known as the Intensive English Language Center (IELC), can be found at California State University, Bakersfield (CSUB). Located in Bakersfield, California, a city at the southern end of central California's San Joaquin Valley, an area that is dominated by the oil and agriculture industries, CSUB is a regional, comprehensive university serving a diverse population of roughly 10,500 students, with over 1200 faculty and staff. With a metropolitan statistical area population of nearly 840,000, Bakersfield is California's ninth largest city and is within easy driving distance to both the

Los Angeles and San Francisco metro areas. The IELC provides six 8-week sessions throughout the year, with students receiving up to 23 hours of instruction per week in academic English reading, writing, listening, and speaking.

Despite the fact that IEPs can play a vital role in helping international students overcome the obstacles inherent in gaining access to American institutions of higher learning, they face several challenges according to Di Maria, including funding, staffing, and quality assurance issues. One particular problem faced by IEPs is the problem of isolation. “Whether the intensive English program is housed within an academic unit, administered by a contracted third-party or managed by the international education office,” writes Di Maria, “there is a tendency for these programs to operate within a silo. The indicators of such isolation include separate applications for intensive English students as opposed to an integrated application, inability for intensive English students to access core campus services (e.g., housing and medical care) and failure of academic departments to recognize satisfactory completion of the intensive English program as a means of demonstrating the required English proficiency requirements.”

Although its students are offered homestays and monthly activities to various museums, businesses, and parks, the sense of silo-ization from the rest of the campus within the IELC is quite apparent. The IELC is administered by a third party, with a separate faculty and staff, and is located quite literally on the fringes of the university, being housed in a building that formerly served as a dormitory. All of this has given the students in the IELC a feeling of isolation and separation from the University proper.

As a way to overcome this disconnect for students in the IELC, it was determined to include these students as part of the campus’ common reader program, known as the Runner Reader program. Common reading programs, according to Delmas and Harrell (2014-15), “are well-established features of the first-year experience (FYE) at many universities and serve to help socialize new students and introduce them to the intellectual endeavors typical of college study.”

The purposes of a common reading program are manifold, according to Laufgraben (2006), and include “To provide a common academic experience for all first-year students and to strengthen the academic atmosphere of the university.” Other purposes include modeling academic behaviors, setting expectations for student success, promoting more meaningful learning, creating life-long learners, and most importantly, fostering involvement.

CSUB’s Runner Reader program, which was started in 2007, has now become an integral component of the campus’ General Education program. At CSUB, the program is an “in-semester” program where students engage with the selected text throughout the first academic term of the school year. The selected reading is a required component of an “Introduction to the University” course and all first-year Composition courses, as well as upper-division general education classes. In addition, numerous events and activities, both on campus and in the wider community, are developed to coincide with the themes of the selected text, with roughly 50 different events planned each year.

This study will document a pilot project, which was part of a larger study that examined the attitudes and experiences of university students’ who are participating in a university common reader, that sought to include IELC students in the Runner Reader Program to assess their experiences in participating in the program; to examine their opinions on the book selection; to evaluate how well the program prepared them for university work; and to gauge the effect of their participation in campus and community events.

Methods

In the fall of 2017, a 10-question pilot survey was administered to 12 students taking an intensive ESL reading/writing course in the University's intensive English program. The course, which focuses on preparing students for the reading and writing skills that they will need to be successful in an American college classroom, is designed for students at the sixth and highest proficiency level that the IELC serves.

While the course uses an ESL reading/writing textbook as the main textbook, students also are required to read a non-textbook selection as a "side reader." In the past, a non-fiction text has been selected, but for the purposes of this study, students in the course read and discussed a young-adult fiction text called *Seedfolks* by Paul Fleischman and Judy Pedersen. This book was chosen to serve as a companion title to the campus's main selection, *\$2.00 a Day: Living on Almost Nothing in America* by Kathryn J. Edin and H. Luke Shaefer.

In addition to regular coursework centered on the reading of *Seedfolks*, students in the course were also encouraged to attend campus and community events tied to the book. In particular, the students were encouraged to attend Edin and Shaefer's keynote campus address, to participate in the question-and-answer session that followed the keynote, and to observe the book signing that took place at the end of the evening.

Students were then surveyed regarding their experiences reading the text as part of their class, their perceptions on how participating in the program helped them to become more academically prepared, how participation in the program encouraged them to participate in campus and community events, and whether that participation made them feel more connected to the campus and the community.

Results

The results of this study showed that the aspects of the program that focused on the selected text *inside* the classroom were clearly helpful. 100% of students in the course reported that they enjoyed reading the selected text, that reading the text helped them to gain a better understanding of English, and that reading the text helped them to gain a better understanding of America culture. Also on a positive note, 83.5% of students reported that they talked to their friends about the book outside of class, while 83.5% of respondents reported that reading the text made them want to learn more about the subject. Additionally, a healthy 66.5% of students reported that reading the text helped them become better prepared for studying in an American college or university.

On the other hand, the aspects of the program that focused on activities outside the classroom proved to be far less effective. Despite the encouragement of their instructors, none of the participants reported attending any of the campus or community events, while only 33.5% of the respondents reported that they felt more connected to the campus and only 16.5% of respondents reported that they felt more connected to the city.

Discussion

The results of this study indicate that participation in the university's common reader program did have a positive effect on IELC students' experience on the campus, though that effect seems to be restricted to student experiences in the classroom itself, with only limited effects outside the classroom.

On the positive side, the use of the book in the IELC reading/writing classroom did seem to have a beneficial effect. Students overwhelmingly enjoyed reading the book, with a majority reporting that they held discussions with their friends regarding the book outside of class. A majority also reported that they felt encouraged to read more about the subject. More

importantly, perhaps because the greater perception of the text to the university's curriculum increased their interest level, all respondents reported that reading the book helped them gain a better understanding of both the English language and American culture in general.

On the negative side, it appears that much more work needs to be done to make this program fully effective. While a third of the respondents did report feeling more connected to the campus because of participation in the program, only a small fraction felt greater connection to the city as a whole. More importantly, none of the respondents in the study reported participation in either campus or community events, despite the encouragement of their instructor. Thus, while students may feel more psychologically connected to the university, they remain physically isolated, especially from the wider community.

While students seem to recognize the value of participating in the program, this study indicates that IEP students remain unwilling to take full advantage of what participation in the program could provide, especially outside the classroom.

In general, it is apparent that IEP instructors need to do more *inside* the classroom to create greater connection *outside* the classroom. For example, instructors of the course may need to consider building a participation score into the grading for the course or give extra credit for participating in campus and community events.

Conclusion

The purpose of this study was to examine the effects that participation in a campus common reader program could have on an Intensive English Program reading/writing course regarding campus participation and connection. While students clearly benefited from activities inside the class in terms of helping them better understand both the English language and American culture, students were clearly not taking full advantage of the program outside of class. From this study, it is clear that more research on how to engage students outside of class is needed.

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Brief biographies of the authors

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Links between Education and Research in ballet art

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Abstract

The education and the research in the choreographic art has an essential meaning. In a such a specific field of an artistic imagination, as the field of choreography, we give the advantage to the causal link between the two specified terms - education and research.

The ballet performance phenomenon is the focus in this project. Basically, each new ballet staging represents the artistic process of the choreographic research. The possibilities for research are related with the imagination of the choreographer and the nature of the plastic expression of the human body. As a rule, the choreographer conquers the plastic expression in the process of ballet education.

The education itself significantly affects the quality of the research process. The express assets and structural dance forms acknowledgement that we elaborate, is well kept and stored in the history of ballet development. They are the solid dance base on which the stage effect is built.

The choreographic process that has been researched includes the knowledge of other types of arts, which are involved in the ballet. The harmony of the performance is achieved through the artistic synthesis of various arts.

Keywords: ballet education, artistic research, imagination, creation

Main Conference Topic: Education, Teaching and Learning, Links between Education and Research

Introduction

The ballet art is characterized by its synthetic nature of effect over the audience, as it includes many arts (music, literature, painting, choreography). Due to the presence of number of arts in the ballet, the choreographer's intuition hides a wide spectrum of creative opportunities which makes this artistic sphere innovative.

The research covers the synthesis of various artistic branches that act in a specific way, according to the interdisciplinary space of the ballet art.

The main role in the arts merging process belongs to the choreography and laws that governs it. It doesn't mean that the other arts are subordinate. On the contrary, the freedom of specific laws that govern various arts expression, that are in reference with the artistic talent of the composer, the librettist, the production designer, the costume designer, and more recently, the master of stage light design, contributes to the enrichment of the creative process.

Frequently, the choreographer is the one that leads the authors crew during a ballet performance. In its territory, named as ballet performance, the choreographer coordinates the work of the numerous artistic crews. Therefore, the stage innovative choreographic surveys

are mostly related to the synthesis of the arts. The choreographer's knowledge of other arts qualitatively enriches the dance science.

From the wide range of interacting arts in ballet, a significant role is given to the music. Unlike the literature, these arts do not operate with words and therefore they refer to the audience and act towards them using a sensuous sphere. Their common feature responds to the closeness of the music and ballet. Despite the significant role of other arts in the ballet performance, the emphasis in this research is focused on the musical art and its influence in the choreographer's research process.

The music in the ballet is also present in the researched choreographic process and in the education process. It is considered as a relevant part of our subject of interest so we're looking at it from two perspectives.

The first aspect is connected with the influence of music on the way of choreographing. We want to show that the inspired choreographed creative impulse is directly born and grown out of the music.

The second aspect refers to the education, that is, learning the process of training the skill of how to dance the music content: creative, inspirational and virtuoso.

In addition to the view of the synthetic nature of ballet art and its influence on choreographed research, the field associated with ballet pedagogy presents the subject of our research. The educational program includes the study and application of the laws and means by which ballet actors dance skills are being raised. From here, the formulation of the problem which determines the essence of the research comes down to the causal relation between the education and the creativity in the research process.

The main topic "Links between education and research in the ballet art", is being proceeded through the acknowledgement of dance means and structural forms expression. As a main subjects in the entire ballet education study process, they are perceived as extremely important for the given research topic.

The dance means of expression in ballet are: classical dance, character dance, historical beat dance, pantomime, modern dance etc. The first declared dance instruments from the classical ballet heritage are encountered. Depending on the choreographer's affinity, contemporary choreographers express their ideas in the plays through modern and other types of dances that had been appearing throughout the 20th century.

We want to emphasize that the dominant presence of one of the express dance instruments in the play determines the genre. Also, the skill of the performers on the stage mostly depends on overcoming the express dance assets in the educational process.

The knowledge of the existing structural forms in ballet (solo variations, pas de deux, pas de trois, grand pas) and other forms through which the ballet performance is being expressed, are assessed as a great importance for the choreographic innovative research. These structural ballet forms are part of the dance education in the educational process of ballet dancers. The research in this field is interesting, but at the same time very difficult choreographic task. Dealing with it contributes to the improvement of the quality of the performances.

Related work

In our survey, we pay special attention to the system of classical dance. It is an European generally acceptable universal system of dance movements. The classical type of system distinguish it self by systematizing the movements into a legitimate whole. More precisely, it is an open system that it is constantly added with a new plastic expression. Therefore, this system holds the primacy in the research process in ballet performances staging.

In addition to the essence of classical dance nature, we turn to the opinion of one of the greatest pedagogues of the 20th century, Nikolay Tarasov. He says: "The basis on which the 'language' of classical dance emerges is particularly lively and natural - it is the very nature of man, the organism of his movements, creative fantasy, emotionality, love and aspiration to the wonderful, noble, exalted, innocent, everything that folks used in their dancing creativity that was later taken over by the ballet theatre " [Тарасов, 1981, p.16].

Ballet dancers are trained on the basis of the classic dance which implies a high technical preparation for dance movements fulfillment. The virtuous technique in the ballet performance is complemented by the artistic expression of the dancers.

Taken by the wide array of movements, the classical system selects those poses and movements that have a certain expression, embracing the particularly tangible characteristic in order to discover the spiritual world of the human being.

It must be emphasized that the system of classical dance primarily represents a system of artistic thinking through which the expression of dance movements is formed, existent in the dance manifestations. In this regard, the classical dance is one of the main means of expression in ballet, with a highly developed system of dance movements and a technique for their performance.

The purpose of this article is to inspire the scientific thought about the nature and the development of the choreographic art. In order to solve this purpose, we aim to devise and deepen the relationship between the education and the research which is connected with the way of dancing on scene. Its obvious that this connection is dictated by the choreographer's creativity. The dancers education and choreographer's creativity are complementary, therefore they move the ballet forward.

Model

We take the elaboration of the classical poses in ballet as an example of this goal achievement. The basic positions in ballet are: croiseé, effaceé, ecarteé and the four arabesques. This seven positions in ballet represents the basic means of expression, a base of ballet grammar. They are subordinate to the spatial and temporal laws of the theater choreography.

It is interesting to note that the number 7 is also associated with the expressive means in other arts. Thus, there are 7 basic notes in the music and 7 basic colors in the art of painting.

Taken by the diversity of dance movements, the classical poses are the pillars through which the stage effect and its emotional line of thinking content is being transmitted. The poses analysis used by the old Masters of choreography in ballet classical heritage shows that the grain of the reflective expression is implanted in the pose. Each of the four arabesques presents the source of the dramatic expression whereby the choreographer finds the way to communicate with the audience.



Figure 1: 1st arabesque

That being so, the first arabesque is characterized by its flexibility in the space and strive toward infinite space. The 1st arabesque poem is the lite theme (leiten motivum) of the second act from the ballet "Giselle" whereby the choreographer reveals the imaginary world of the villas.



Figure 2: 2nd arabesque

Unlike the 1st arabesque, the 2nd arabesque communicates with the viewer with a dose of coquetry. A typical example is the variation of the Amor in the dream of the ballet "Don Quixote".



Figure 3: 3rd arabesque

The 3rd arabesque is the opposite of the first two, characterized by its rigorousness, closeness and withdrawal into themselves. Therefore, the choreographers utilize this arabesque into the dance of the negative heroes in the play. The 3 arabesque is characteristic for the wizard Rothbart in the "Swan Lake" ballet.



Figure4: 4th arabesque

The 4th arabesque is dominated and does not succumb to others dictation. It is known for the positive characters who exquisitely highlight their own will.

"There are approximately 4 arabesques, so different from one another, but when boldly addressed, they tend to reveal the truth, reflect the smallest soul movements, and through their expression to illuminate the germ of the thought and its commitment to the goal as well as the impersonation of the inner survival of the actor in the role". [Мячин, 2011, p.19]

The classical poses in their pure form are being taught in the schools. Straightforward, this quotation gives full freedom to the choreographer who by knowing the canons of the classic postures, tints them in various dressings of the colors. The action of the poetically-generalized manner is precisely revealed through the choreographed and compositional diversity, which is characteristic for the seven poses in the ballet. It is the relationship that needs to cherish the link between the education and the research.

Implementation

The essence of the phenomenon-the choreography, is best revealed through the description existent in the qualitative method which at the same time is the most utilized and most acceptable for processing the artistic aspects. In this context we determine the method of research, which is acceptable in the social and human sciences. This is the historical method in which we use the empirical approach to analyze the dance achievements. The most dominant and the most appreciated element in arts is the spiritual element of a man. The qualitative method implementation contributes to the understanding of the artistic essence of the phenomenon - the choreography in the ballet.

Results

This year has been declared as a year of European classical heritage in the arts. By reason of that, in matter of the article, we turn towards the music as one of the leading components in the ballet performance. We focus our discussion on the essential link between music and choreography. The new forms of stage expression, both in the past and often today, is associated with the set relation between the composer-choreographer. In the traditional conception of this relationship, we can speak of high professionalism and mutual respect of two ingenious artists as the composer Petar Ilyich Tchaikovsky and the choreographer Marius Petipa.

The great composer Petar Ilyich Tchaikovsky with the symphonic approach to music in his three ballets "Swan Lake", "Sleeping Beauty" and the ballet "Nutcracker" carries out the reform in the ballet. The music genius Tchaikovsky's not only turns the historical course of the previous way of writing ballet scores, but the acting role that he gives to the music in ballets, also acts in the choreographic dramaturgy. The reform significantly affects the way the choreographed text is being created. The music and the choreography are inextricably linked into a musical-choreographed dramaturgy.

This historically drawn guideline is part of the many paths by which the contemporary choreographed researches are set in motion.

In this regard, the new discoveries are very different. They represent a field for a wider discussion. In this discussion, it is not possible to answer the question with an accuracy: What the choreographed reading of a musical work stands for? Immediately we disclaim ourselves

because the possibilities of converting any musical work into choreography are inexhaustible. Various dance works can be choreographed on the same music. It depends on the individuality of the choreographer, his style, his taste, the direction he nourishes, as well as the aesthetic requirements of the time in which this ballet work is being created. Starting from the practice, we firmly advocate the necessity line of an extensive knowledge of the complex expressive means in music and dance.

The great masters of choreography from the past profoundly knew and mastered the laws of music. The choreographers themselves also composed music, played several instruments and directed the plays. In addition to the ballet education, many world famous choreographers from the 20th century, had completed a musical conservatory, as in the case of Georges Balanchine.

Today music studies rely on two basic moments: firstly, the withhold of the traditional musical forms and secondly the transformation of their conventional structures through the expansion of the musical expression horizons in order to create a new sound matter.

In the domain of our interest is the choreography as a visual interpreter of the music. The research in this field goes in the direction of a visual installation into the rhythmic, dynamic and melodic placement of music. Thereby, the dance and the music come together in one aesthetic wholeness in which the visual rhythmic correlation is being achieved.

Therefore, the mutual connection between the composer and the choreographer is an opportunity for a deeper penetration into the orbit of the dance research. The outcome of the synthesis between the sound perception and the plastic visibility in the contemporary choreographed module, creates the ballet association in which the relationship between the knowledge and the research becomes essential.

Conclusion

With our hypothesis we want to emphasize that the high quality of ballet art is achieved through the link education-research. It represents the respect for the established system of classical dance movements and their links towards discovering the pulse of the new in choreography. The challenge in this research topic is how the synthesis process of music and choreography evolves.

The task that we lean our focus on is set towards developing creativity and creation of a new one which would correspond to the contemporary time. The new thing that the stage reveals naturally absorbs into the choreographed vocabulary, presenting the quality of the brand new which has to be implemented in the pedagogical approach to the study of dance art. The mutual relationship provides the desired results.

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Brief biographies of the authors

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In 1973 student at the State Institute for Theatrical Arts in Moscow.

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In 1993 -1997 Artistic Director of the Ballet Company at the Macedonian National Theatre.

She has published the following books:

- ☐ “History of the world of ballet”
- ☐ “Founders of Macedonian ballet”
- ☐ “Entries for the great masters of ballet”

Changes and Culture Influenced Modifications in the Technique of Culture Assimilator

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Abstract

The article is concerned with the technique of culture assimilator and its development. It follows the ideas of Thomas (2000) who claims that culture assimilator can be itself culture-dependent and may undergo changes influenced by the value standards of its users. The objective of the research part of the article was to verify whether the claims of Thomas (2000) would be valid in Polish circumstances.

Having analyzed the material collected during the classes of intercultural communication taught at a university level in Poland, the author of this article concludes that nowadays the technique of culture assimilator tends to differ from its original form and that some of the modifications introduced by students into the technique could be ascribed to the influence of Polish cultural standards. The kinds of modifications introduced into the technique are described and explained.

Keywords: culture assimilator, cultural mini-drama, culture teaching techniques, cross-cultural training

Main Conference Topic: Learning/Teaching Methodologies and Assessment

Introduction

Culture assimilator is a quite old technique which is still widely used for teaching culture in foreign/second language education and in intercultural training. In this article I try to delineate the way the technique developed from its original form into the variety of forms that can be encountered nowadays. I am also interested to verify whether Thomas' statement (2000) that the technique is itself culture-dependent and gets modified according to the cultural standards of particular nations applies to the case of Poland. In the research part of the article I analyze cultural assimilators designed by the students of the University of Applied Sciences in Nysa and I look for conclusions concerning the possible influence Polish culture could have had on the kinds of changes introduced into the technique.

Theory

BEGINNINGS

Culture assimilator (sometimes called cultural mini-drama) was developed in 1962 at the Faculty of Psychology, University of Illinois by Fidler and his co-workers (Thomas, 2000:302) in the form of cross-cultural training task for students. The technique is still widely used and well evaluated in foreign/second language teaching and in cross-cultural training. Its original US 1962 form consisted of:

- a) a narrative or a dialogue that described a critical incident¹ involving one's own natives and members of a foreign culture,
- b) four alternative options to choose from, asking students to react in some way to the situation described or to interpret the situation,
- c) answer key and feedback explanations providing further information on why a particular option was correct or not.

In the original US version of the technique one of the options was always designed to be correct (it was supposed to be capturing the point of view of a foreign person), while the other three options (the distractors) might have seemed viable but in fact they mostly relied on the learner's native cultural background. The task of the student was to read the material and choose the correct option. The technique clearly encouraged the use of intuition and guessing. It was closed (no longer answers were required and the explanations concerning the good and bad options were always provided). The form was also easy for the students as "instead of thoroughly analyzing the episode, viewing it from different perspectives, discussing possible explanations or reactions which might follow, the learner was forced into a simplified yes-no pattern" (Thomas, 2000:394). Moreover, it used to be a "safe" technique, not so intimidating to shy or less creative students who had no intercultural stories of their own and not enough cross-cultural experience to be able to draw from it for examples.

CRITISISM

The technique as such seemed simple and practical as it was teaching concrete cultural behaviours. Still, it soon started to be criticized as endangered with misinterpretation, prejudice and stereotyping. It was also accused of the 'black and white fallacy' and of simplifying things instead of facing the complexity of real life (Thomas, 2000:396). "Life and culture are terribly complex. The truth is that for any one critical incident, it is not only difficult to give a single correct answer, but it is usually wrong to do so. Life does not always afford pat answers", argued Williams (1982:607). The author went further to explain that if an assimilator was supposed to be teaching about reality, it could not restrict its options to mere 'yes' or 'no' answers. It needed to provide for a variety or at least some degree of flexibility. "If the cultural assimilator is actually to be an experience, a slice of life, it must be open to multiple interpretations as life itself. Rather than having right and wrong alternatives alone, one should be allowed to give [...] explanations that are partially right and partially wrong, generally wrong but sometimes right or generally right but sometimes wrong" (1982:607). Moreover, as Williams says, the technique should not make the learners feel that answers to cultural questions are obvious and can be given as ready made universals: "culture assimilators must not be used to convey the mistaken impression that there are stock answers to every cultural question" (Williams, 1982:607).

Following the criticism of the original form of culture assimilator, varieties of the technique started to appear. The most popular modifications consisted in adding more than one correct option to the set of choices and in making the answer scale less rigid so that it allowed not only for 'completely correct / totally incorrect' answers but also for those that could be to different degrees acceptable or unacceptable.

¹ Critical incident – a situation which is problematic and confusing. The idea of *critical incident* was elaborated by John C. Flanagan with the intention to use it in industry for the sake of gathering information about the staff and their behaviour in certain situations. The concept has been later transported into the field of foreign language teaching.

INFLUENCED BY CULTURE

Thomas (2000) suggested that the various changes the technique had undergone might have been culture influenced. In his article “Intercultural Training is a Specific Interaction Process” the author explains how the features of the technique get modified to fit the cultural standards² of particular nations. As the author observed, the concept of a cultural assimilator (at least in its original not modified form) reflects typically American standards (such as simplicity, straightforwardness, being practical not theoretical), whereas the newer varieties of the technique tend to reflect the cultural standards of their users. And so, for example, he explains that in Germany the US variety of culture assimilator (with one correct, three incorrect options) was often criticized for its tendency towards simplifying and generalizing problems of real life. That is probably why the department of Social and Organizational Psychology of the University of Regensburg decided to develop culture assimilators that were more customized to German standards. They developed their own version in which the learner was asked to evaluate to which extent he/she considered particular answers to be correct (Thomas, 2000:396). “The trainee is asked to judge the degree to which he believes the answer could be a correct explanation for the incident. He thus rates how culturally isomorphic he believes an answer to be on a four-point scale ranging from ‘most probable’, ‘possible’, ‘improbable’ and ‘least possible’” (Thomas, 2000:396).

As far as Czech culture is concerned, the author believes that in this country culture assimilator will work best when presented as discussion material. He explains the statement by referring to Czech cultural standards denominated as “personal relationship and importance of face-to-face interaction” (2000:397). Thomas suggests that the discussion could have the form of inviting students to express their opinions on each of the options before providing them with the answer (2000:397). According to the author, due to their cultural standards, Czech people will be likely to treat the technique of culture assimilator with mistrust and skepticism. Czechs, as he says, do not like being told what is acceptable and what is not, especially when there is no chance to talk about what might be “a bit right” or “a bit wrong” (Thomas, 2000:398). “[They] usually dislike fixed structures and therefore only sometimes keep to them, preferring instead to improvise. They regard being flexible, subtle, clever and creative as key characteristics of their own culture. Every situation is made use of which offers the chance to improvise” (Schroll-Machl et al., after Thomas 2000:397). That is why, as the author explains, Czech people will not readily accept the simple, fixed and schematic structures of the US form of culture assimilator.

According to Thomas (2000:397) Czech natives would long for greater detail in the description of critical incidents (to the point of changing the incidents into realistic stories). They would tend to make the situations more complex. The author also explains that Czech communication is not always straightforwardly direct. It often relies on the use of hints, metaphors and implicit, hidden information. These features of Czech rhetoric, as Thomas states, “are the most complete opposite to the culture assimilator concept [which is supposed to be] clear, logical, and [as] rational as possible” (2000:398). Thus, as the author assumes, in Czech Republic the technique will be questioned and criticized, and consequently, it is likely to be significantly modified.³

² Thomas (2000) explains that cultural standards “can be defined as way of perceiving, thinking, judging and acting, which are seen as normal and naturally obligatory by members of a certain culture” (Thomas, 2000:393).

³ The author does not specify what the modification he mentions would be.

Method

Following the idea that culture assimilator in its original form is not widely accepted and is very likely to be changed according to the values of particular nations, I decided to analyze the work of Polish students with respect to the technique. The material I used for the research was collected in the years 2012-2013 and 2015-2016 during the classes of intercultural communication I was teaching. Two groups of altogether 47 English Studies third year students were presented with the technique of a cultural assimilator and asked to prepare three or four culture assimilators on their own.

All the assimilators given to students as a sample of the technique came from the books *Cultural Awareness – Resource Books for Teachers* by Barry Tomalin and Susan Stempleski (1993) and *Teaching Language in Context* by Alice Omaggio Hadley (1993). Tomalin and Stempleski's descriptions of critical incidents are very short, of about 100-110 words. They are all followed by two questions, both of which have their 'abcd' options. The instructions tell the learner to read the situation described and choose the best answers. They emphasize that sometimes more than one answer is possible. The answers in the key always start with the phrase "the most likely explanations are". Most often the authors label two options as "the most likely ones". They also explain why those two are the most probable ones. They are not referring at all to the other options (the ones not labeled as "most likely"). We might assume they consider them wrong and that is probably also the message implicitly conveyed to learners. So Tomalin and Stempleski are always referring to the "most likely" options. They never say things will happen this or that way for sure. Sometimes their "most likely" is only one of the four alternatives.

Omaggio asks to choose only one "correct" answer. In the key she explains all four of them, clarifying why only one is correct and why the other three are incorrect. Her description of the critical incident is very short, of about 100 words.

All the cultural assimilators provided in the books of Tomalin and Stempleski as well in the book of Omaggio are of intermediate level, which means they are obviously too easy for English studies students. That is why my students were only shown the assimilators as a sample of the technique. In fact there are not many books that could provide teachers with assimilators customized to the level of advanced learners, that is why I decided to follow to suggestion of Williams (1982: 607) and ask students to prepare assimilators on their own and teach them to the group.

Students were clearly explained what the structure of the technique is. They were also warned that:

- culture assimilators should refer to value conflicts,
- they should be accurate, realistic and convincing,
- they should be based on real-life experience,
- they should avoid oversimplification, especially in the feedback explanation,
- they should stimulate reflection (Williams, 1982:607).

Students were advised to refer to their own intercultural experience. Those who admitted they had not enough intercultural experience to be able to come up with original critical incidents were advised to interview other people – their family or friends who could provide them with first hand reports of such experience. All the assimilators were to be original and self-written. And the students were warned they would be later teaching the assimilators they prepared to the whole group taking part in the class. They were asked to write two or three assimilators and were given one month to do it.

Findings

All the assimilators were handed in printed or handwritten.

Several students prepared assimilators that seemed to be perfect realizations of the form, with critical incidents described within about 100 words, 'abcd' options provided and instructions clarifying that more than one answer might be correct. Still, the majority of students tended to introduce certain changes into the technique.

The most frequently introduced changes were several. First of all, Polish students were very likely to describe the critical situations with much greater detail, turning the description into a story (almost into a literary piece) told in the past tense and asking, as if in retrospect, for the explanations of the cultural misunderstandings presented in the story. It was most often a story consisting of 100-200 words, written in past tense in third person singular and often relating a real situation that once took place. The story described some cultural misunderstanding and the author of the assimilator typically asked what went wrong. Many of the stories were clearly past experience of the authors or of the people they were talking to. That is probably why the past tense and retrospection appeared so often.

During the presentations students were quite obviously trying to introduce the element of a discussion, as if they felt it was inappropriate to impose answers on the learners without letting them comment on the options. It seems they felt the cultural assimilator longed to be discussed. A very popular tendency was to make the task more open through the use of open questions inviting reflection and discussion. The open questions usually started with "what would you say/do..?" or "why do you think (something happened)?" There was also some variety concerning the feedback and the way students indicated acceptable and unacceptable options. The majority of them opted for more than one option correct. And the fact that "more than one option may be correct" was always clearly indicated in the instructions.

One student decided to formulate a different scale for evaluating answers. The answer key that formed part of his assimilator stated that a particular choice could be either "bad option", "good option" or "best option". All of the options were of course further explained.

In several cases students did not refer to any critical incident that would involve people from different cultures, but just described a foreign custom or routine and provided the description with the choice of four options that asked the respondent about how he/she should behave in that particular situation. This seems quite different from what the original cultural assimilator was supposed to be. Here, the feeling of uncertainty, characteristic of intercultural encounters, appears not in the description of the situation, but rather in the questions posed to the respondent. The question is "what would/should you do?" – not anybody else but you, the foreigner reading the task and possibly hesitating about the answer. This variety of the technique allowed for an extremely short and schematic description (consisting of about 20 words, see the example below). And the "should" used in the question implied that one is expected to follow the local traditions, as in the example quoted below:

Imagine that situations take place in Netherlands. What would you do in each situation? In some cases more than one answer is possible

1. You would like to get a gift from Santa Claus. How should you invite Santa Claus to your home?
 - a) write a letter with your wishes
 - b) leave a sock next to the fireplace
 - c) leave an empty box on the doormat
 - d) hang a lantern by the front door
2. You unexpectedly meet a good friend whom you have not seen for a very long time. How will you welcome her?
 - a) you are so happy that you hug her warm and kiss her cheek
 - b) you wave your hand and say "Hoi"
 - c) you shake your hand and say "Hoi"

d) you just say “Hoi”

(written by 3rd year student, University of Applied Sciences in Nysa)

Sometimes students, as was the case above, put the word “imagine” in the instruction, emphasizing the fact that the situation is hypothetical for the reader. The question “what would you do?” following the description of a situation and accompanied with four options to choose from was frequently used by the students.

Some students gave no alternative options at all, but designed the description to be followed by a set of open questions, like

1. What would you do in such a situation?
2. How would you feel?
3. Is the situation likely to happen in your country?

Others did include a critical incident in their descriptions, but also used the open type of questions. The most frequently used open question was: “what would you do?” The question sounds very practical, yet it dramatically changes the character of what culture assimilator was supposed to be. The question turned the assimilator into a different, more open technique.

One more tendency that completely changed the character of the technique was to describe a situation and then ask questions concerning the country where the situation could have happened. Typically the a choice of two countries, the native one and a foreign one, was provided. (E.g. “Do you think the situation took place in Poland or in Scotland?”).

Questions that most often followed this format were:

- What do you think of the behaviour / the custom?
- Would you like to introduce it in your country?
- Would it be likely to catch on?

Or (about a situation)

- Is that possible to happen in your country?

Other modifications of the technique were very minor and they are not mentioned in the article.

Discussion

Among the values that are believed to constitute Polish cultural standards I found two that might be related to the ways students modified the technique of culture assimilator. These are distrust⁴ and emotionalism⁵. Polish people are distrustful of the written word, and especially of written orders, recommendations and the “dos and don’ts” that are communicated to the reader without any kind of personal explanation on the part of their author. Also emotionalism (the tendency to externalize emotions) has typically been a well-known Polish quality (which many nations disapproved of). In Poland, externalizing emotions has always meant being authentic and honest. That is why this non-verbal element of communication, assured only by personal contact and face-to-face interaction, has always been very important.

As far as Polish students’ performance with cultural assimilators is concerned, it was clearly visible that the group was not satisfied with the traditional structure of the technique. Most of the times students longed to modify the structure by introducing the element of discussion into it. Discussion often sprang up spontaneously. Moreover, when students talked to me before their presentations, they almost always mentioned the element of personal contact with the class. They always emphasized they would be there to offer further explanations of the options and to encourage the class to brainstorm about the issues

⁴ See Młokosiewicz (2015).

⁵ See Hoffman (1990) and Wierzbicka (1985).

discussed. So the elements of personal, face-to-face communication and discussion were as if taken for granted and perceived as necessary by Polish students.

What the research also showed was that Polish students did not like the very restricted form of the multiple choice (one option correct, three incorrect) variety of the technique. They visibly tried to avoid this form. They always introduced some variety into the technique, be it in the form of providing greater number of correct options (and thus making the activity more challenging) or in the form of making the technique more open (by involving discussion and open questions instead of options). Students seemed not to be satisfied with the mere selection of options. They did not like the answers to be rigorously imposed on the respondent. During class presentations they seemed happy to see the group come up with a range of ideas and they eagerly commented on all the suggestions made.

Of course, one might say that designing successful distractors in a multiple choice activity is a task that requires more work and greater number of skills than writing down an open question to be discussed. So writing an open question might have been simply easier to students. I have to admit not controlling this factor was a weakness of my research which will probably have to be made up for in future research on the topic to insure greater validity of results.

One more important issue to mention is that probably not all the modifications introduced into the technique by Polish students can be easily explained by cultural standards, as probably culture is not the only source of the changes observed. What also needs to be taken into consideration here is students' previous learning experience, which might have shaped their preferences for techniques and strategies.

Conclusion

The use of culture assimilator is very likely to be culture specific. The technique seems to be reflective of the cultural values of those who are dealing with it. The ways culture assimilators are modified by particular nations are also likely to be reflective of their native cultural norms and standards. And so, for example, both Czech and Polish people will tend to extend the technique by adding the element of discussion into it. Polish people, who are culturally more likely to believe the word of mouth (rather than what is written down), and who prefer face-to-face contact allowing for the appearance of emotions, will probably get greater benefit from the use of the technique when it is done orally in the presence of a trainer and with lots of opportunities to talk. The original "one correct" answer multiple choice variety of the technique will certainly be treated in Poland with considerable distrust as a form which is too limited and too restrictive, incapable of showing the whole truth.

It is important to notice that some of the changes described in this article may have appeared as a result of students' previous educational experience. Moreover, the English studies students whose work has been used in the research might have been themselves considerably anglicized due to their intensive contact with the language and culture of English speaking countries. Thus the behaviour and beliefs of the group might have not been fully representative of purely Polish cultural standards. Certainly the fact that the group used for the investigation were English studies students must have influenced to some extent the data obtained. This fact should also be taken into consideration in future research.

Implications

If we want to use the technique of culture assimilator in the most effective way we need to customize it to the cultural standards of its users. Not customizing the technique according to the needs of a particular nation means not using the technique in its full potential.

The findings presented in this article provide teachers of foreign and second language as well as cross-cultural trainers with the ideas of how to make the best of the culture assimilator technique when it is used in Poland. Recognizing that there is a whole repertoire of culture assimilator related techniques will also be of concern to those who are involved in the preparation of courses and publication of books dealing with foreign/second language and cross-cultural issues. Teachers and trainers will benefit from the knowledge of how to customize the technique of culture assimilator to make the most of it while it is used in Poland.

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Correlation between Tolerance of Ambiguity, Anxiety, and Willingness to Communicate with Risk Taking in the Second Language Class

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Abstract

Risk Taking is a crucial ability, fundamental for developing of skills such as speaking, writing, listening and reading. Brown (2007, 389) defines it as a “willingness to gamble, to try out hunches about a language with the possibility of being wrong.” Second language teachers often complain about lack of class participation in some students. These students’ oral performance often is weaker in terms of fluency and sometimes also in terms of accuracy than in those who often take part in discussions. Similarly, in the second productive skill – the written communication – RT differs from student to student and influence the writing competence. While educators consider possible reasons of the lack of willingness to communicate in the learners’ low motivation or assume them not to spend enough time in preparing for the class, they seldom pay closer attention to phenomena such as high or low tolerance of ambiguity towards the linguistic and cultural alterity and high or low level of anxiety resulting from the class atmosphere.

Keywords: Tolerance of Ambiguity, Anxiety, Willingness to Communicate, Risk Taking, Second Language

Main Conference Topic: Education, Teaching and E-learning

Introduction

The first psychological trait – *Ambiguity Tolerance* (AT) – can be seen as a positive ability to accept a new, partially not yet understood input and discourse types not matching those from the native culture. It can also be characterized as “a style in which an individual is relatively well suited to withstand or manage a high degree of uncertainty in a linguistic context” (Brown 2007, 376). The second psychological phenomenon – *Anxiety* – represents a “subjective feeling of tension, apprehension, and nervousness (....)” (Brown 2007, 376). The third significant variable appearing in context of risk taking is the *Willingness to Communicate* (WTC) which is defined by Brown as a “predisposition toward or away from communicating, given the choice” (Brown, 2007: 392).

Research in the field of cognitive psychology delivers reach findings about the affective underpinning of cognition (Isen, 1975; Isen & Freidman, 1977) however, those not always apply on second language acquisition situations, since communicating in a second

language is a unique process, governed by its own special rules. Till date, there have been not many studies conducted on risk taking in the second language. The most prevalent and informative one is the *Analysis* by Ely (1986). This empiric survey investigates the impact of Discomfort, Risktaking, Sociability, and Motivation on L2-class participation. A more general view on risk taking in education delivers a K-3 teacher guide by Young (1991) however, describing only conditions for encouraging risk-taking behavior in students of elementary schools. Relatively more studies addressed the phenomena of Anxiety, Ambiguity Tolerance, and Willingness to Communicate (WTC) (Crookall *et al.*, 1991; MacIntyre *et al.*, 1998; Phillips, 1968; Clément *et al.*, 2003; Bledsoe, 2011).

The purpose of this paper, is to prove that TA and Anxiety influence Risk-Taking in second language/foreign language class. Additionally, the article investigates how the Risk-Taking ability and the Willingness to Communicate both, influence the Class Participation. Third, the paper argues that Risk Taking is not only an individual psychological feature but it is an ability which can be developed in students and used by them as a learning strategy.

The three variables Tolerance of Ambiguity, Anxiety, and Willingness to Communicate seem to correlate with a risk-taking behavior in second language class. The paper first investigates how existing high level of AT in students may influence their risk-taking behavior in written and oral communicative situation.

Research findings – Literature overview

I. Tolerance of Ambiguity and Anxiety influence Risk Taking in L2

AT and Anxiety observations are not easy, because mental activities with little external behavior are not observable (Tayebnik *et al.* 2013, 75). Therefore, teachers need to be sensitive to and aware of the existence of these personality traits in students. A range of empirical studies dedicated to AT and Anxiety seeks correlation between these both characteristics and proficiency development in L2. Ely (1989) explained the relationship between AT and L2-learning and developed a scale of tolerance of ambiguity. He characterizes AT as an aspect of personality or cognitive style and emphasizes the relation between AT and second language learning. According to Ely,

tolerance of ambiguity, as hypothesized, was found to be a significant negative predictor of various strategies which involve focusing on individual language elements: planning out exactly what to say ahead of time, thinking carefully about grammar when writing, looking up words in English right away when reading and asking teacher for the right words when speaking. Also, students high in tolerance of ambiguity did not mind speaking even when they were unsure of possessing the correct language tools (Ely, 1989, 442)

As already proven by Larsen-Freeman & Cameron (2008, 132), language develops through interaction with other interlocutors and language proficiency can develop only by language use (Jessner *et al.*, 2016, 132). Maintaining communication in a second language is a big challenge which cannot be successful without a trial-error behavior. Effective learning

happens namely through collecting experiences. Risk Taking therefore, is an essential component of learning processes.

Although couple of studies did not confirm a direct correlation between AT and effective learning, it is still worth to examine their results. Başöz (2015) investigated whether AT of EFL learners affects their vocabulary knowledge and whether there is any gender-related difference in tolerance of ambiguity of EFL learners. He found out "that gender does not have any significant impact on tolerance of ambiguity" (53, 2015). Surprisingly, there was also no significant relationship between AT and vocabulary knowledge, "whereas a significant relationship between tolerance of ambiguity and self-perceived achievement in foreign language vocabulary learning" (Başöz, 53, 2015) was confirmed. The self-perceived achievement is being estimated mostly by judging the linguistic and cultural distance of the native and the target languages/cultures. If the alterity is considered high the learning success seems less possible. In effect, Risk Taking does not occur. Tayebinik & Puteh (2013) investigated the effect of AT on the participation of 120 students in online EFL courses using Ambiguity Tolerance Scale (Budner, 1962) to differentiate tolerant and intolerant students. The analysis revealed a remarkable impact of AT on participation. The findings confirmed that tolerant students were more interested in participating in online EFL courses than intolerant students (Tayebinik & Puteh, 2013, 207-208). As participation and risk-taking are interrelated (Ely, 1986), there is a clear indication that AT influences risk-taking.

The second factor correlated with risk-taking is the Anxiety. Baran-Łucarz defines it also as "one of the variable of L2 WTC" (2014, 450). She hypothesizes that there are differences in the level of anxiety while using a foreign language in class and in a real-life conversational situation. The evaluation of the performance in class by the teacher and classmates may increase the anxiety level, especially in adolescent students. The "projected dangers, such as making themselves ridiculous and losing face in front of significant others" (Baran-Łucarz, 2014, 450) has often stronger impact than potential benefits of class participation. Interestingly, the most frequent source of anxiety in adolescent and adult FL learners is related to students' self-perception about pronunciation. Baran-Łucarz identifies in her study the "fear of being evaluated negatively by peers due to one's pronunciation" (2014, 451) as the strongest type of anxiety in a FL class. Considering suggestions from the side of students, collected by the researcher, this type of anxiety may be reduced by good classroom dynamic fostering respect and tolerance among the classmates. At this point, it is vital to emphasize the teacher's role in creating a fearless classroom atmosphere. Similarly, other research findings confirm that anxiety is the central factor influencing RT as it negatively affects students' WTC.

Crookall & Oxford (1991) state that many teachers do not acknowledge the existence of strong anxiety in some students. The authors propose that teachers should deal with the phenomenon of anxiety implicitly and explicitly. First, by creating learning conditions "that will keep anxiety at reasonable low level", second by encouraging learners "to discuss anxiety openly and find creative ways of softening it" (1991, 150). Rolin-Ianziti & Varshney (2008) indicate that many L2 educators believe that immersion programs increase the extent of anxiety in students and their negative reactions, especially while the framework-oriented interactions are performed in the L2 (2008, 252). Yet, no correlation has been found between an intensive use of the target language and the amount of anxiety. Moreover, students

appreciated the challenge of the target language. Supposingly, it depends more on the teaching techniques in immersion courses and other monolingual programs whether students feel lost and anxious while being surrounded by the foreign language.

Jessner *et al.* though advocate for “a re-orientation from monolingual norms to multicompetence” (2016, 175) that requires to “accredit a less prominent role to the linguistic deficits of second language learners and users” (Jessner, 2008, 10) and instead focus on the cognitive benefits offered by multilingualism. (Jessner *et al.* 2016, 175). Due to this approach, students will develop in an inductive way the desired metalinguistic language awareness and “a higher cognitive flexibility and creativity” (Herdina & Jessner, 2002, 108). Error treatment and anxiety remain in a reciprocal correlation and immediately affect the bi-/multilingualism development. Therefore, an optimal “error pedagogy” (Bohnensteffen, 2010, 55) must be created by teachers in relation to particular students and learner groups to avoid psychical blockades and support positive attitude toward the target language and the willingness to experiment with the linguistic elements. Instead of the assessment function, the diagnostic and prognostic functions of errors should be made plausible to students (Bohnensteffen, 2010, 99).

Anxiety results in feeling of discomfort that prohibit spontaneous behavior. Ely (...) operationalized the construct of Discomfort caused by anxiety in second language class and described its impact on motivation and class participation. According to Ely, anxiety has been found to be negatively correlated with proficiency/but one casual analysis failed to show a link between situational anxiety and achievement, however the results vary from each other. In general, affective variables in L2 achievement influence classroom activity and the participation influences language proficiency. Language class discomfort affected classroom participation indirectly through negative effect on language class risktaking (Ely, 1986).

II. Impact of Risk-Taking ability and Willingness to Communicate on Class Participation

While examining the relation between RT-ability and Class Participation, the central term – WTC – appears. Young (1991) distinguishes significant differences between risk-taking in children and in adults. Children volunteer enthusiastically while teenagers and older audience ask “Can I be successful?” or “Will I embarrass myself?” (Young, 1991, 7). Young describes these differences with the conclusion:

somewhere between kindergarten and adulthood we lose that eagerness, that willingness to take a risk simply for the sake of learning something new. This loss creates adults who lead safe, low-risk lives and, in addition, contributes to the large number of adults who no longer actively pursue learning. (Young, 1991, 7).

This statement certainly is a generalization, as not every child is willing to take risk to the same extent and there still are adults who are ready to involve themselves into a risky situation in a foreign language class. Yet, one fact is true in children as in adults as well: without putting “the primary focus on success or failure” (Young, 1991, 8) risk-takers are more likely to practice written and spoken language in new grammatical settings, using

improvisation during oral interaction, experimenting with worldbuilding and reacting nonverbal (Young, 1991, 9-10).

For Ely (1989, 438), affective reasons for risktaking or not-risktaking are personality threads such as extroversion and introversion. He formulates constructs of a mental concept of RT such as “language class Risk-taking and language Class Sociability depend on adventuresomeness, spontaneity and flexibility in social behavior. Low level of these components causes a feeling of language class discomfort (Ely, 1986, 10). As a contrast behavior, Ely names social inhibition and restraint which in a L2-class are narrowed to tendency to assume risk in using L2.

Furthermore, accordingly to Ely’s findings RT depends on factors such as 1) lack of hesitancy in using new linguistic elements, 2) willingness to use complex and difficult elements, 3) tolerance of possible incorrectness and inexactitude as well as 4) inclination to rehearse a new element silently before using it aloud. These are the four dimension of the construct of RT. But they are not the only factors increasing the RT-behavior. One could add also willingness to experiment with linguistic elements in order to compose (precise and correct) message. The conclusion of Ely’s important study is that language class RT is a positive predictor of students’ voluntary classroom participation which can be interpreted as “RT is a positive predictor of WTC” as well.

Discussion and Conclusion

Risk Taking in a L2 Class – a learnable ability?

As proven above, low AT and high anxiety in L2 Class have a negative impact on students’ RT while RT-ability positively influences WTC in L2. In conclusion, AT and RT can be considered crucial attitudes (abilities) supporting a successful L2-acquisition. Assuming that AT and RT can be trained just like learning strategies, it could accelerate students’ learning process as they would participate more intensively in the class and learn through experience which is a very effective way of learning.

Students learning a second/foreign language are exposed to ambiguous situations and actions in which they have to deal with phonological, lexical-semantic, grammatical, pragmatic, and cultural alterity. In effect, they are constantly challenged with assessments requiring fundamental changes in the way learners are used to think, speak, write, use body language, choose appropriate reactions to sociocultural issues. The functional logic of the particular second language and the cultural patterns of the target culture differ from the own ones. Subliminally, people acquiring a foreign language face emotional treats while trying to comprehend and to construct utterances in the target language. Yet, the level of this emotional discomfort differs from one individual to the other, depending on experience with exposure to ambiguous communicative situations, on self-confidence and motivation level, and often on age. The tolerance of ambiguous cultural patterns represents even a larger field than the AT toward foreign linguistic phenomena. Lack of this type of tolerance may result from existing bias and prejudices toward the target culture while low level of AT towards language structures and pronunciation patterns may result from lack of self-confidence and

resistance in dealing with the unknown. The same factors influence AT deficit while comprehending new vocabulary.

Undoubtedly, teacher's behavior in the class plays a significant role in developing students' AT in all the mentioned areas. Contextualization, building of hypothesis and proving them are hermeneutic strategies (...) that students can acquire after some longer and intensive training. Therefore, it is crucial to expose learners to authentic materials and complex utterances in the second language. A popular training offer Intercomprehension projects, such as InterCom or EuroCom¹ using L1 and other languages of the students to help them comprehend the content in the target language. These procedures promise a positive change in the development of AT.

For practitioners, the second significant question whether also RT can be developed as an effect of an intended training. On the one hand, the above overview of research findings indicates that RT is a personality threat (Ely, 1989, 438) and an internal feature of a student. These would mean that students with less motivation for RT could be encouraged to it by raising their feeling of psychical comfort. Yet, the results of research on RT from the point of view of cognitive psychology which investigates the impact of feelings on cognition and behavior, leads to quite contradicting results:

The prediction of risk taking from positive affect is not straightforward. Two lines of thinking and research lead to opposing, or at least complex, predictions for risk taking under conditions of positive affect." On the one hand when people are feeling good they are more optimistic and willing to take risk, on the other hand even in good mood subjects can activate a mechanism protecting them from taking risk (Isen *et al.*, 1982, 254-255).

Although psychological factors have much larger impact on foreign/second language class output than they were long supposed to have and although they should undoubtable be considered in the research on student's success, it is also crucial to design a universal methodology helping each student to successively develop RT-competence, regardless of his/her personality features. Such a training should consider students inductive and deductive way to learn and the following six variables correlated with RT:

1. The role of language awareness (AT)
2. The role of intercomprehension training
3. The role of awareness of risk-taking necessity
4. The role of Anxiety consciousness - coaching
5. The role of risk-taking training
6. The experience of difficulty (hermeneutic training)

Some of these factors are proposed by Jessner *et al.* (2016) as important components of Dynamic Model of Multilingualism (DMM) based on the Dynamic Complexity Theory. In their study on emergent metalinguistic and cross-linguistic awareness in children, the authors emphasize the effectiveness of "early and intensive contact with three or more languages" (2016, 158-176) for enhancement of the AT and RT. Especially the already mentioned competence of intercomprehension, which uses similarities and differences between

¹ http://www.eurocom.uni-frankfurt.de/english/compact/kurs/text_seite_1468.htm

languages from the same language family, seems to be a key-competence in dealing with bi- and multilingual environment (European Commission, 2012; Klaveren *et al.*, 2013).

Not to overestimate is the role of experience-based learning (Kolb, 1984) in RT-training. This approach consists of four elements:

The cycle begins with an **experience** that the student has had, followed by an **opportunity to reflect** on that experience. Then students may **conceptualize and draw conclusions** about what they experienced and observed, leading to future actions in which the students **experiment** with different behaviors.²

However, there are certain conditions of experimental learning. One of them requires teachers to establish a sense of trust, respect, openness, and concern for the well-being of the students. Role playing and open-ended projects are some of typical assignments in experimental learning.

In general, teachers can do a lot for development of RT-behavior of L2-students. From appropriate error treatment, creating of low-stress class atmosphere through problem-solving approach and student-friendly instructional routines up to acceptance of the child and the child's ideas (Young, 1991, 13). Beside these class standards, important is the teacher's own attitude toward risk taking. He "must be a risk taker and model risk-taking behavior, including a positive view of failure. Unique and innovative ideas must be viewed as signs of (...) growth (Young, 1991, 13). Teachers must emphasize that the process of learning is the goal not only a product, as advocated by Young: "By lessening the significance placed on the product (a significance that often mistakenly convinces children that there is only one correct answer and those who don't know it are stupid), the child will be more willing to take risks" (Young, 1991, 14).

The same role can be applied on education of adults. Young names RT "a prerequisite to becoming an effective problem solver and decision maker" (1991, 11) This ability makes a person more productive. To become effective problem solvers, students should develop a positive view regarding failure (errors!). There is a strong correlation between error treatment by the teacher and the risktaking willingness by students. Errors therefore must be recognized as a learning experience and not as a failure. Yet, not only teachers' way to treat errors is crucial for development of the risktaking ability. His/her entire behavior includes many other critical factors that determine whether learners will take risk in class and outside or not. It is the teacher who constructs the learning environment and the class atmosphere. His/her attitude influences students' attitude and their confidence level. (Young, 1991, 11-12)

Taking the above discussion points into consideration, a rich spectrum of activities opens on the teacher's side which allow to effectively work on students' attitude towards *Ambiguity Tolerance* and *Risk Taking* turning them into conscious strategy-based competences.

² What is experience-based learning? <http://serc.carleton.edu/introgeo/enviropjects/what.html>

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Preliminary Consideration On The Effectiveness Of Peer Assessment For Nurturing Systems Thinking Skills

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Abstract

This research is a practical study on teaching pedagogies for nurturing systems thinking skills of students. It is set authentic performance tasks relevant to social life, and using self assessment and peer assessment as a tool engage students in the learning process. As students themselves adjusted their learning, they tried to enhance subjective and interactive learning. In addition, using Casual Loop Diagrams (CLD) as an assessment tool to visualize their thinking. It is suggested that using CLD for learning activities is effective for enhancing system thinking skills and problem solving skills.

Keywords: Peer Assessment, Systems Thinking Skills, Rubric, Casual Loop Diagrams (CLD)

Main Conference Topic: Effective Teaching Pedagogies, Science education, Learning to Learn.

Introduction

Education is a major change period. The OECD is currently promoting the Education 2030 by proposing to the world the future of education. It is said that Children entering school in 2018 will be young adults in 2030. Schools are facing increasing demands to prepare students for rapid economic, environmental and social changes, for jobs that have not yet been created, for technologies that have not yet been invented, and to solve social problems that have not yet been anticipated. It is also said Education can equip learners with the agency, the competencies and the sense of purpose to shape their own lives and contribute to those of others. Therefore, change is imminent. The Future of Education and Skills 2030 project aims to help countries find answers to what knowledge, skills, attitudes and values are needed for today's students to thrive and shape their world, as well as how instructional systems can effectively develop them (OECD, 2018).

Since 2015, the Japan Government and the Ministry of Education have been promoting policy dialogues with the OECD, and are proceeding with various educational reforms based on the future curriculum design, as well as revising new course of study that emphasizes the development of qualities and abilities (MEXT, 2015).

Andreas Schleicher, director of the OECD Education and Skills, is highly acclaimed the Japanese education system as follows. 'Since the start of the PISA 2000, the Japan has consistently been successful in getting 'a control strategy' which is learning strategies to solve unknown problems by managing and structuring what students have learned, without relying on 'memorization strategies.' (MEXT, 2017).

On the other hand, In Japan, the percentage of students who are taking 'the strategy of the expansion', an active learning strategy for proactively linking various knowledge, is low in the participating countries. This shows that it is not successful in doing AL beyond the subject.

In Japan high schools, there is an increasing interest in AL to deepen the learning of the subject. However, there are still few cases in which we are working to nurture students' qualities and abilities with a view beyond the subject. I think that it is an urgent issue from an international viewpoint to work on the improvement of the class from the viewpoint of AL which fosters a wide quality and the ability which is conscious of the education 2030, the 21st century skill which is the current of the world education reform.

Review

1. Self-assessment and Peer assessment

There is a similar reviews focus on self and peer assessment. Self assessment promoted self-reflection, problem- solving and more responsibility for one's learning (Dochy, et. al, 1999). Self and peer assessment can positively affect student learning by helping them develop their reflective and critical thinking skills, as well as their self-confidence as learner (Logan, E., 2009). Ndoye (2017) investigated students' perceive ways in which peer and self-assessment can help engage them in their own learning, make them responsibility for it, and develop their collaborative learning skills by promoting a positive and supportive learning environment. Ahmad (2017) compared between Students' self-assessment and Teachers' assessment. It is concluded that the students are able to assess themselves accurately if they are provided with assessment criteria and trained on how to use them, and by offering them with feedback about self-assessment.

University of Reading's website is mentioned about effectiveness and Significance of Peer and self-assessment as bellow.

Peer and self-assessment, where students assess each other and themselves, can encourage students to take greater responsibility for their learning. For example, by encouraging engagement with assessment criteria and reflection of their own performance and that of their peers. Through this, students can learn from their previous mistakes, identify their strengths and weaknesses and learn to target their learning accordingly. Getting students to become more active in their learning in this way can help to alter the perception of learning as being a passive process whereby students listen to you and absorb the information in order to regurgitate during a subsequent assignment. If students are participants rather than 'spectators', they are more likely to engage with their learning.

The learning activities in the future must be actively students-centered learning. To improve the quality of learning, it is set essential questions. It is important to show the goals and the path and to take steps that allow the student to monitor that learning is progressing in the right direction.

2. Systems Thinking Skills

Society is changing quickly. Therefore, it is necessary for students to acquire the ability to deal with the change. The OECD Learning Framework 2030 offers a vision. OECD (2018) is mentioned that Students will need to apply their knowledge in unknown and evolving circumstances. For this, they will need a broad range of skills, including cognitive and meta-cognitive skills (e.g. critical thinking, creative thinking, learning to learn and self-regulation); social and emotional skills (e.g. empathy, self-efficacy and collaboration); and practical and physical skills (e.g. using new information and communication technology devices).

The concept of key competencies in sustainability can be regarded as a specification and further development of 21st century skills such as critical thinking, problem solving, communication, collaboration, and creativity (Kay, K. & Greenhill, V., 2012). Rim (2011) is also mentioned Systems thinking is a fundamental 21st Century skill that has evolved out of engineering and machine- based learning.

Kay B., et. al (2016) mentioned about systems thinking competency in sustainability learning in high school. *'Students are able to analyze basic structures of sustainability problems by applying systems concepts including cause-effect structures and feedback loops. Systems thinking in sustainability problem-solving involves recognizing and root causes of the problem, identifying intervention points, and positioning critical actors in the problem constellation. This competence enables students to outline solution options that effectively mitigate critical problem drivers.'*

In a complex society, it is necessary to solve a variety of problems, and we must look at the background of the problem rather than on the surface. In order to survive the Society of the future, it is necessary to acquire the ability to examine the essence of the problem. Systems thinking, which is a central concept of critical thinking is essential for the success of the educational reform for fostering 21st century competencies.

Methodology

Participants were 38 students enrolled in a Biology class in high school from May to November 2017. It is set a performance task in 'Biodiversity' and examined the effectiveness of assessment tools such as self assessment and peer assessment for the development of the system thinking ability from the contents of student's results and post essay.

1. The practice of systems thinking skills

First, the students read the material about 'Biodiversity Conservation' they were given (see Appendix 1). Second, they analyze the current situation with the learned matter by themselves, and summarize their idea of the solution to the problem in short essay. Next, they showed their relationship in a casual loop diagram.

Each individual causal loop diagram was mutually evaluated by the group. The results of peer assessment are feedback to each student. Finally, the causal loop diagram was re-created based on evaluation and advice from others.

2. Casual Loop Diagram (CLD)

Systems thinking is a method of thinking that captures and analyzes objects as a system. The system is composed of several elements, and the whole system functions by interacting with each component. There are many kind of thinking tool such as a mind map, a spray chart, a fish bone, and so on. In this study, the causal Loop diagram was adopted in the assessment tools because it was aimed at the target of the object in the system, focusing on the causal relation of the problem, and acquiring the knowledge of the problem solving. Casual loop diagram is a great tool to visualize how each element in the system is affected. Figure 1 is an example of the CLD.

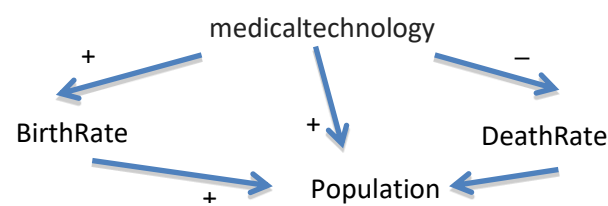


Figure.1: Casual Loop Diagram

Results and discussion

Students created a short essay and CLD based on a reading material (Appendix 1) and Rubric (Appendix 2). After that, students were divided into groups of four to five people and conducted a peer assessment. Peer assessments are intended to improve the direction and quality of learning for students. Then, the result is feedback to the students individually after implementation.

Two students, who were low in evaluation score in the peer assessment, were focused in this chapter. Figure 2 is the CLD of student A before the peer assessment. Student A pays attention to the effects of air pollution on biodiversity, but has not been able to express it well in the CLD. However, after the peer assessment, it is changed and showed that the cause and the background are captured in the CLD (Figure 3).



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Student A. However, after the peer assessment, it is showed that the idea extends even to the inheritance of the industry and the tradition of the region (Figure 5).

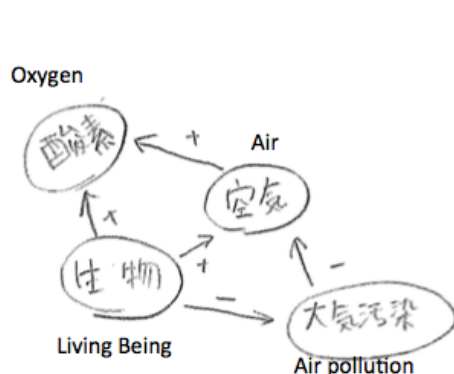


Figure.4: Student B's CLD

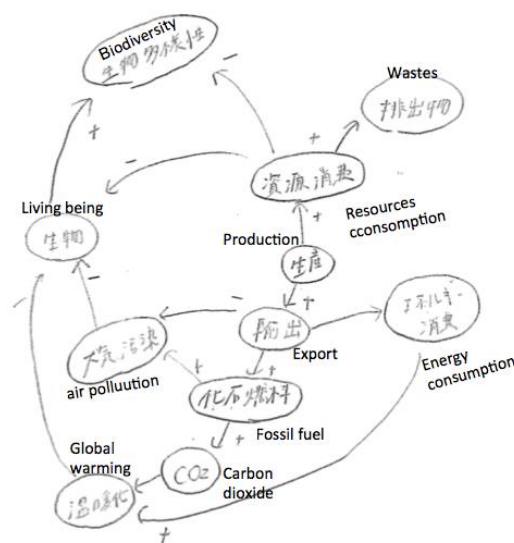


Figure.5: Student B's CLD

The results of students A and B were greatly altered as a result of positive suggestions and advice from others. It is considered to be a good example of the effectiveness of self-assessment and peer assessment.

2. Short essay after the work

It can be seen that the comments obtained from interviews with following several students realize the significance of finding the whole and relationship, on the basis of collaborative learning with peers and the demonstration of multifaceted thinking. Results of students interview are given in Table 1.

Table 1: Results of students interview

The most important thing in maintaining biodiversity is to think about things from different perspectives. It is important to judge from a variety of viewpoints rather than from a single point of view. When we think about deforestation, we have to think about planting trees and improving soil, and after that. That is, it is necessary to determine the combined. It is necessary to think about not only the result but also the background.
It is difficult to realize the benefits of biodiversity. We tend to talk about things from a person's point of view. When we think about the big world of biodiversity, we should not think only of the viewpoint. It is important to realize that we are part of life on Earth. In order to preserve biodiversity, we believe that it is important to know that and to live with interest.
What we can do to protect biodiversity is to protect the natural environment. It is important to know not only to protect but also to live in harmony. To prevent global warming by promoting local consumption of locally produced foods in the region.
Human beings enjoy the services produced by a variety of organisms and are engaged in social activities and economic acts. There are a variety of food, water, fuel, wood supply services and cultural services that bring about spiritual enrichment. It is necessary to refrain from pursuing only the profit in the presence and depriving of nature. In order to create a sustainable society, it is important to keep in mind only what is necessary when necessary.
Our social activities are moving better by the diversity of organisms. We should act positively in that. It is to have a wide view which looks to the world. Although the most familiar place is a region, living

The most important thing in maintaining biodiversity is to think about things from different perspectives. It is important to judge from a variety of viewpoints rather than from a single point of view. When we think about deforestation, we have to think about planting trees and improving soil, and after that. That is, it is necessary to determine the combined. It is necessary to think about not only the result but also the background.

things live all over the world, and it is indispensable existence. First, we have a broad view to the world.

Conclusion

The purpose of this study is not to make the CLD. CLD expressing deeper knowledge on the complex issues clearly, it is just one of the tools to communicate to others. What to use the CLD and also draw a CLD without thinking about anything doesn't make sense. Senge (2011) mentioned that "derived from loop diagrams appear complicated at first glance, in fact, about a situation extremely simplistic view, it is not fully analyze all situations. (SNIP) and this figure is quite useful as a conversation starter, but some sort of system always make sure students understand to not ". Many issues have to be cleared in incorporating the CLD work this way, too.

After the practice, one of the student have interviewed. It is said that 'I think I can associate with things, think about that. In addition, eyes turn to the things didn't bother me until now, can have the awareness of the issues. I could feel that when the graphical representation of each word in CLD work, finds an unexpected connection between wider deployment of thoughts.

Learning activities using the CLD is effective in systems thinking abilities capture the cause behind the problems, things take a bird's eye view. I think it could be inferred from the student works and post interview.

Remarkable progress in science and technology, knowledge acquired is to be used tomorrow could be. In the ever-changing social need that extracts information from various things, to go against, and predict the direction of change, to keep learning and ability to learn. I think is important to make more substantial efforts to continued nurturing and ability clearly.

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Appendix A

Reading material: T.Sekiguchi (2010) "What are we going to lose? Real intention-biodiversity" p20-38, Jyurinshasosho.

I would like to ask another question here. What is "local and global" in biodiversity? (Somewhat)

Consider, for example, "coffee beans".

Coffee has historically been mass produced in developing countries such as Africa, South America, Southeast Asia. Those countries spreading in the tropics were blessed with diverse nature from the beginning, but the ecosystem was destroyed by excessive plantation, and biodiversity was rapidly lost. We sometimes call such areas a "hot spot" in danger.

Coffee is now the most widely traded item in the world after oil. Its market price changes from moment to moment, producers are constantly being swayed by trends in international markets in addition to weather. If the price soars, profits are expected, and the surrounding forests are crushed and turned into farms. On the contrary, if there are overlapping crashes and unseasonable weather, management will become difficult and the plantation will be closed. However, it is not so if the environment returns to its original form. Some coffee farms have become a premiere of rare creatures in a long history. If the farm gets rough, after all, people also suffer from living things.

Movements to solve these complicated problems and to support sustainable coffee production are emerging from companies and NGOs all over the world. Create a system that certifies products produced under a sound business environment as "sustainable / coffee" and deals at an appropriate price. Invest in local infrastructure development and human resource development. (Abbreviation) From the coffee beans on the shelves of supermarkets, we can contribute to biodiversity conservation behind the earth. (Somewhat)

Biodiversity is tied to unique land and environment, local traditions and culture. Therefore, in order to preserve it, the activities targeting each area, the viewpoint of regional emphasis becomes important. (Somewhat)

The important thing is to act positively in both the global and local, with a compound eye viewpoint. It seems to be difficult, but in reality the traditional local industry like the Toyohashi brush has faced these challenges many times in a long history and probably has overcome it. You do not have to stand on the big top. Let's turn a single brush softly toward "the back of the earth". Let's check the feel of "raw hair".

Appendix 2 《Rubric》

(1) Comprehensive and multidimensional idea.	
3	CLD shows biodiversity issues in a multilateral perspective.
2	CLD shows partial catches of biodiversity issues.
1	CLD is not shows regarded as a problem of biological diversity.
(2) Attitude of interconnectedness	
3	CLD shows endangered species have received threats and extinction causation, the background and catches.
2	CLD firmly shows endangered species have received threats and extinction causation.
1	CLD shows do not accurately reflect endangered species have received threats and extinction causation.
(3) Critical thinking	
3	CLD shows loss of species on the impact on the ecosystem and human life.
2	CLD shows influence of species loss ecological or human life.
1	CLD do not show the influence of species loss and ecosystem.
(4) Prediction of the future	
3	CLD firmly and concretely shown human protection, solutions.
2	CLD have expressed about the proposed solution of human protection.
1	CLD does not contain the proposed solution of human protection.

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Interpersonal differences in opinion on the areas of intercultural problems on global market

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Abstract

Entrepreneurs face many challenges in today's ultra-competitive business world. The global business is affected by a number of factors like differences in- socio, economic, cultural, legal and political environments. This paper examines (1) gender views of students on factors that may prevent or slow their personal attitude toward global entrepreneurship and (2) can push students to start their own business. Increased entrepreneurial activity is dependent on many factors and the results of empirical data show that women perceive intercultural differences on the global market and also possibilities of intercultural problems in doing entrepreneurship. Better access to quality entrepreneurship education can have a beneficial impact on the success of potential entrepreneurs. Entrepreneurial training develops the right skills for the jobs being created, whether in formal employment or entrepreneurial self-employment.

Keywords: graduates, education, entrepreneurship, global labour market, interculturality

Main Conference Topic: Education, Teaching and E-learning

Introduction

The literature recognizes the interconnectedness of people across the world through various manifestations of crosscultural floods and / or employment, self-employment of individuals (Poulis et al., 2012; Berry, 2003). Rapid internalization and globalization has increased the significance of workforce diversity. As a result, a cross-cultural and multicultural workforce is now a common thread in corporations globally (Shen et al., 2009). The value of entrepreneurship is dissimilar for different people, Nielsen, Lassen (2012) survey of students and other populations showed that it is not only the prospect of making money that motivates entrepreneurs. It is more the desire for 'independence' and 'achievement' that drives the potential entrepreneur (Shane, 2003). The decision to start a venture has both cultural and economic dimensions.

Areas of intercultural problems for future global business

The explanation of different entrepreneurial activity across nations and regions is linked to differences in values and beliefs between potential entrepreneurs and populations as a whole (Baum et al., 1993). Cultural barriers and differences have direct influence on decisions and entrepreneurial behaviors among member of particular cultural community (House et al., 2004, p. 21). Cultural values, practices, national culture can support or impede entrepreneurial behavior at the individual level (Hayton et al., 2002, pp. 33-52). The cultural differences among groups may consist of ethnic heritage, values, traditions, languages,

history, sense of self, and racial attitudes (Jenčová, 2016, p. 47-53; Svitačová, 2014; Džupková, 2017, p. 112-116; Roháčová, 2016, p. 54-58). Any of these cultural features can become barriers to working together. Successful entrepreneurship must be based on mutual respect, a valuing of difference, trust, a plan, lots of patience, determination to adopt new attitudes and pull in partners not usually involved, and, most of all, a sense of common purpose. In literature, there is a debate on the classification of Conflict studies. There are two major camps studying the nature of conflict in literature. Scholars in the first camp are influenced by international relations and political economy advocating that the nature of conflict is related to ethnicity, cross cultural disputes, religious differences and socio economic inequality (Litterer, 1996). Scholars in the second camp have pledged their loyalty to management and organizational behavior studies insisting that conflict is individual and organizational issue affecting group interactions and firm performance in long run (Bennet, 2002). Studies such as those of Hayton et al. (2002), Licht and Siegel (2006), Gupta et al. (2004) have found that national cultural dimensions have significant influence on entrepreneurship. Based on these results, we can say that students perception intercultural problems on to way to entrepreneurship.

Research methodology

Objective: We focus on students' interest in business on the global country.

Methods: The questionnaire was aimed on Areas of Intercultural Problems for future global business. The respondents answer the questions by selecting scale 1-5 (1 disagree - 5 agree).

Characteristics of sample: The survey was conducted in technical universities in Slovakia. The selection of these universities was in line with our purpose. Representative sample consisted of 1078 students enrolled in master's or engineer's degree. Data collection was carried out in april 2017. Obtained data were further processed using the statistical package of MS Excel and then we used MS WinStat. By processing of empirical data by the methods of descriptive statistics - 2 χ , the evaluation data was obtained which are presented in table. The survey is administered through a web-based questionnaire and is standardised for all participating countries based on a common study design.

Findings of research: In consideration of the broad base of the results there are only list of the key findings. In tables 1,2, 3 the evaluation data reached by processing of empirical data by the methods of descriptive statistics are presented. The interpretation of some findings is only functional at the basic statistical level (descriptive statistics and one-dimensional variance analysis). Data shown in the tables allows tracking of respondents' selfevaluation in the engineering/magister type of study by presenting their consideration to start a business. Searching for differences between students and students of an engineering type of bachelor and master degree (in higher education) in terms of areas of intercultural problems. Interpretation of some findings is only functional at the basic statistical level (descriptive statistics and one-dimensional analysis of variance) general conclusions about these differences can bring new insights into in the field of attractiveness to apply to the global labor market.

The results of the survey

The results of the empirical data processing shown in Table 1 give the opportunity to conclude that two differences of statistically significant differences were found in the intergrowth differences in terms of intercultural problems. The first is the case of gender roles in cultures ($F = 11,277$ and $p = 0,001$). The average measured score shows that men ($M = 2.90$) are less able to assess the possibility of intercultural problems than women in this area ($M = 3.20$).

The second area is the difference in the perception of different temperament and character as potential areas of intercultural difference ($F = 6,818$ and $p = 0,009$). Women ($M = 3.76$) perceive this area as an area where intercultural differences should occur, compared to men ($M = 3.56$). On the contrary, the differences in planning, agreement and planning relationship ($F = 0.225$ and $p = 0.636$) and motivation of employees ($F = 0.290$ and $p = 0.591$) are the smallest. In both cases it can be stated that both students and students do not know whether intercultural problems could arise in these areas. This is probably related to insufficient knowledge of the issues of both groups.

Table 1 Interpersonal differences in opinion on the areas of intercultural problems (descriptive statistics + ANOVA)

In your opinion, in which areas could intercultural problems arise?		N	Average	SD	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Working with information	Man	771	3,06	1,16	,0419	2,975	3,139	1,0	5,0
	woman	307	3,12	1,11	,0634	2,999	3,248	1,0	5,0
	Total	1078	3,08	1,15	,0350	3,007	3,145	1,0	5,0
Relationships in the workplace, in the team	Man	771	3,56	1,07	,0385	3,485	3,636	1,0	5,0
	woman	307	3,64	1,10	,0627	3,515	3,762	1,0	5,0
	Total	1078	3,58	1,08	,0328	3,518	3,647	1,0	5,0
Behavior during communication / discussion	Man	771	3,43	1,08	,0390	3,349	3,502	1,0	5,0
	woman	307	3,56	1,03	,0587	3,445	3,676	1,0	5,0
	Total	1078	3,46	1,07	,0326	3,400	3,528	1,0	5,0
Specific negotiating strategies	Man	771	3,16	0,95	,0341	3,093	3,226	1,0	5,0
	woman	307	3,30	0,93	,0529	3,196	3,404	1,0	5,0
	Total	1078	3,20	0,94	,0287	3,143	3,256	1,0	5,0
Some Ideas on Quality and Customer Expectations	Man	771	3,39	1,06	,0381	3,312	3,461	1,0	5,0
	woman	307	3,47	1,05	,0599	3,355	3,590	1,0	5,0
	Total	1078	3,41	1,06	,0322	3,348	3,474	1,0	5,0
Planning, agreements and relationship to planning	Man	771	3,23	1,00	,0359	3,164	3,305	1,0	5,0
	woman	307	3,27	1,04	,0596	3,150	3,384	1,0	5,0
	Total	1078	3,24	1,01	,0308	3,184	3,304	1,0	5,0
Structures and decision-making processes	Man	771	3,11	0,99	,0356	3,044	3,184	1,0	5,0
	woman	307	3,19	1,00	,0570	3,080	3,304	1,0	5,0
	Total	1078	3,14	0,99	,0302	3,077	3,196	1,0	5,0
Staff management and their expectations	Man	771	3,47	1,05	,0377	3,392	3,540	1,0	5,0
	woman	307	3,59	1,07	,0610	3,473	3,713	1,0	5,0
	Total	1078	3,50	1,06	,0321	3,439	3,565	1,0	5,0
Motivation of employees	Man	771	3,30	1,15	,0415	3,218	3,381	1,0	5,0
	woman	307	3,34	1,21	,0688	3,207	3,477	1,0	5,0
	Total	1078	3,31	1,17	,0355	3,242	3,381	1,0	5,0
Business Etiquette at the workplace	Man	771	3,39	1,10	,0395	3,313	3,468	1,0	5,0
	woman	307	3,46	1,17	,0666	3,332	3,594	1,0	5,0
	Total	1078	3,41	1,12	,0340	3,344	3,478	1,0	5,0
Management of conflicts	Man	771	3,26	1,01	,0363	3,190	3,332	1,0	5,0
	woman	307	3,31	1,08	,0617	3,188	3,431	1,0	5,0
	Total	1078	3,27	1,03	,0313	3,213	3,336	1,0	5,0
Language barriers	Man	771	3,51	1,13	,0408	3,433	3,594	1,0	5,0
	woman	307	3,57	1,21	,0691	3,437	3,709	1,0	5,0
	Total	1078	3,53	1,16	,0352	3,461	3,600	1,0	5,0
Different temperament and character	Man	771	3,56	1,09	,0391	3,486	3,640	1,0	5,0
	woman	307	3,75	1,05	,0599	3,635	3,870	1,0	5,0
	Total	1078	3,62	1,08	,0328	3,552	3,681	1,0	5,0
Age difference	Man	771	2,69	1,15	,0416	2,612	2,776	1,0	5,0
	woman	307	2,80	1,20	,0682	2,664	2,932	1,0	5,0
	Total	1078	2,72	1,17	,0355	2,654	2,793	1,0	5,0
The gender role in cultures	Man	771	2,90	1,30	,0467	2,812	2,996	1,0	5,0
	woman	307	3,20	1,26	,0717	3,054	3,336	1,0	5,0
	Total	1078	2,99	1,29	,0394	2,910	3,064	1,0	5,0

In your opinion, in which areas could intercultural problems arise?		Sum of Squares	df	Mean Square	F	Sig.
Working with information	Between Groups	,977	1,00	0,98	,741	,390
	Within Groups	1418,785	1076,00	1,32		
	Total	1419,763	1077,00			
Relationships in the workplace, in the team	Between Groups	1,340	1,00	1,34	1,157	,282
	Within Groups	1246,812	1076,00	1,16		
	Total	1248,152	1077,00			
Behavior during communication / discussion	Between Groups	3,992	1,00	3,99	3,503	,062
	Within Groups	1226,097	1076,00	1,14		
	Total	1230,089	1077,00			
Specific negotiating strategies	Between Groups	4,312	1,00	4,31	4,875	,027
	Within Groups	951,807	1076,00	0,88		
	Total	956,120	1077,00			
Some Ideas on Quality and Customer Expectations	Between Groups	1,616	1,00	1,62	1,450	,229
	Within Groups	1199,334	1076,00	1,11		
	Total	1200,951	1077,00			
Planning, agreements and relationship to planning	Between Groups	,230	1,00	0,23	,225	,636
	Within Groups	1100,606	1076,00	1,02		
	Total	1100,836	1077,00			
Structures and decision-making processes	Between Groups	1,337	1,00	1,34	1,358	,244
	Within Groups	1059,617	1076,00	0,98		
	Total	1060,955	1077,00			
Staff management and their expectations	Between Groups	3,553	1,00	3,55	3,197	,074
	Within Groups	1195,943	1076,00	1,11		
	Total	1199,496	1077,00			
Motivation of employees	Between Groups	,395	1,00	0,39	,290	,591
	Within Groups	1466,878	1076,00	1,36		
	Total	1467,273	1077,00			
Business Etiquette at the workplace	Between Groups	1,143	1,00	1,14	,916	,339
	Within Groups	1341,808	1076,00	1,25		
	Total	1342,951	1077,00			
Management of conflicts	Between Groups	,522	1,00	0,52	,493	,483
	Within Groups	1138,202	1076,00	1,06		
	Total	1138,724	1077,00			
Language barriers	Between Groups	,782	1,00	0,78	,584	,445
	Within Groups	1439,708	1076,00	1,34		
	Total	1440,490	1077,00			
Different temperament and character	Between Groups	7,888	1,00	7,89	6,818	,009
	Within Groups	1244,885	1076,00	1,16		
	Total	1252,773	1077,00			
Age difference	Between Groups	2,381	1,00	2,38	1,751	,186
	Within Groups	1463,240	1076,00	1,36		
	Total	1465,622	1077,00			
The gender role in cultures	Between Groups	18,647	1,00	18,65	11,277	,001
	Within Groups	1779,171	1076,00	1,65		
	Total	1797,818	1077,00			

Discussion and conclusions

This study was designed to show students' problems related to their start up entrepreneurship. Fielding (1996) reports on fundamental patterns of cultural differences, and infers that the following are barriers to effective intercultural entrepreneurship amongst learners: defensiveness, different world views, different values and beliefs, prejudices, different languages, different ways of using and interpreting the non-verbal code, different ways of constructing messages, unequal power, and the failure to allow for individual cultural differences within a group. These descriptions point out some of the recurring causes of entrepreneurship difficulties in a multicultural environment. As learners enter into multicultural environment or dialogue or collaboration, they are often faced with these generalized differences. According to Dyers, Wankah (2010), Dlomo (2003) speakers from different cultures have varying degrees of linguistic and communicative competence in English. According to authors (Martin, Nakayama, 2000) leads to miscommunication because most people are unaware that non-verbal patterns are determined by culture, and that people from different cultures have different interpretations of these behaviors in a given situation. Nonverbal communicative behavior, such as concept of time or the use of space, differs widely from culture to culture (Ilečko, Sorger, 2016, p. 40-46). Misinterpretation of non-verbal behavior often leads to the development of stereotypes and negative attitudes. Ybema and Byun (2009) emphasize that culture difference includes two parts: management style and staff behavior. Similarly, Zanoni and Janssens (2004) make an assumption that the demographic categories reflect essential differences in attitude, personality, and behaviour between employees linking power, language and diversity together.

Conclusion

The internalization and globalization has increased the significance of workforce diversity. As a result, a cross-cultural and multicultural workforce is now a common thread in corporations globally (Shen, Chanda, D'Netto, Monga, 2009). We based our research on the idea that the potencial entrepreneur is very sensitive to its environment being therefore affected by the institutional and cultural context of his country. The paper underlined an important aspect: Changing culture can be done through education! Valorizing this emerging potential can only be realized through improving by changes in the entrepreneurial education (Burger, O'Neill, Mahadea, 2005). The main objective of the European Commission is to promote entrepreneurship education and stress its importance at all levels from primary school to university and beyond. Generally, entrepreneurship education aims to increase the awareness of entrepreneurship as a career option, and enhance the understanding of the process involved in initiating and managing a new business enterprise (Lee, Wong, 2011). As a consequence of an increasing demand, entrepreneurship education within higher education has experienced a remarkable expansion (Green, Rice, 2007). For companies involved in global business operations the relationship of managers and subordinates in multinational firms is important (Ybema, Buyn, 2009). The results of the study strongly indicate that teaching members of different cultures to behave like each other is an ineffective approach to improving intercultural interactions in business settings- Focus should be placed on using individual differences to create innovation. Training and development of individuals involved in intercultural interactions should involve more than simply promoting cultural adaptation. Development of "global" entrepreneurial skills and abilities focused on to fully exploit the potential of an individual is priority of realized new scientific project at KSV TUKE of Košice, entitled Education for the needs of the global labour market with an emphasis on business activities directed at the education of the students of non-economic study programs of the second level of higher education - future leaders, managers, traders, entrepreneurs,

development workers, called practitioners who through interdisciplinary integrated learning will be able to adequately apply at the "business and the global" chair and can transfer the precepts of academia to practice.

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The Relationship Between Organizational Identification and Organizational Dissent at Upper-Secondary State Schools

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Abstract

The purpose of this research is to investigate the relationship between organizational identification and organizational dissent according to views of teachers working at upper-secondary state schools in Isparta province of Turkey during the academic year 2017-2018. In this regard, the research aims to investigate teachers' views both on organizational identification in the dimensions of "adaptation", "identification" and "internalization" and on organizational dissent in the dimensions of "articulated", "latent" and "displaced" and whether there is a significant difference in terms of such variables as gender, age, seniority, seniority at current school, school type, union membership, and social media use. In the research, whether organizational identification is a significant predictor of organizational dissent was also investigated. The research was conducted through relational survey model. In the identification of sample, the proportionate technique was used. The sample of the study consisted of 291 upper-secondary school teachers. "Organizational Identification Scale" and "Organizational Dissent Scale" were used as data collection instruments. Research results are expected to indicate that there is a significant relationship between organizational identification and organizational dissent and that organizational identification could be a significant predictor of organizational dissent.

Keywords: Teacher, Organizational Identification, Organizational Dissent

Higher Education for Lifelong Learners: Evaluation of an Online Counseling Program

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Abstract

The number of students taking at least one online course increased by over 570,000 to a new total of 6.7 million in U.S.A. in 2012. The proportion of all students taking at least one online course is at an all-time high of 28-32% percent (Allen, & Seaman, 2013; Online Learning Consortium, 2016). Meanwhile, more online programs are offered in U.S.A., but, limited application of learning technologies are found for counselor education. This may be a result of some counselor education faculty who are uncertain about uses and effectiveness of online learning. Such information is needed to help educators and administrators on how to adopt high technology to expand higher education for adult learners. In the current study, effectiveness of teaching and learning strategies were examined in an online counselor education program of a public research university in Southeastern U.S.A. in spring, 2017.

An online survey was conducted by Survey Monkey in spring, 2017. The questions included comparing online and previous on-campus experiences, online learning preference and effectiveness, student satisfaction, etc. A total of 20 students in Counselor Education completed an online survey in spring 2016, including 19 women and 1 man at the university. Mean age was 32. The sample consists of European Americans (89.47%), African American (5.26%), and Asian Americans 5.26%. Looking back over the past year (fall 2016 and spring 2017), 50% of the students thought their learning in online classes was similar to their on-campus classes. Fifty percent of them thought it was better compared to previous on-campus classes. The students selected virtual class as the most effective learning tool, which was delivered through Blackboard Collaborate. This virtual class platform allows audio-visual teaching and learning activities. The students listed the following virtual learning experiences as they liked the most: whole class discussion, chat box, PowerPoint presentation, and breakout chat rooms. Next, the students also liked learning modules in Moodle including current events, current articles, and weekly discussion forum. In terms of homework or projects, the students liked papers and written projects, and participation/activities in class. They liked examination the least. All the students were satisfied with the online classes in the program. Student suggestions were also collected. They suggested guest speakers, more guidance before a breakout activity, teachers' encouragement to utilize the school resources, such as the library, reduction of the amount of papers and projects, and more polling.

In summary, the study shows that the online program was effective. Student satisfaction was 100%. The study provides some preliminary information about online learning in a helping profession. It appears that the students prefer synchronous learning over asynchronous learning. Interactions in a class is important for student learning, which include instructor and students, and whole class discussion. This finding echoes on-campus student learning. Finally, the students seem to prefer writing papers and projects from written examinations.

Keywords: online learning, online teaching, online education, virtual class

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